

**FEEDS OF THE WORLD**  
**Their Digestibility and Composition**

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# FEEDS OF THE WORLD

## THEIR DIGESTIBILITY AND COMPOSITION

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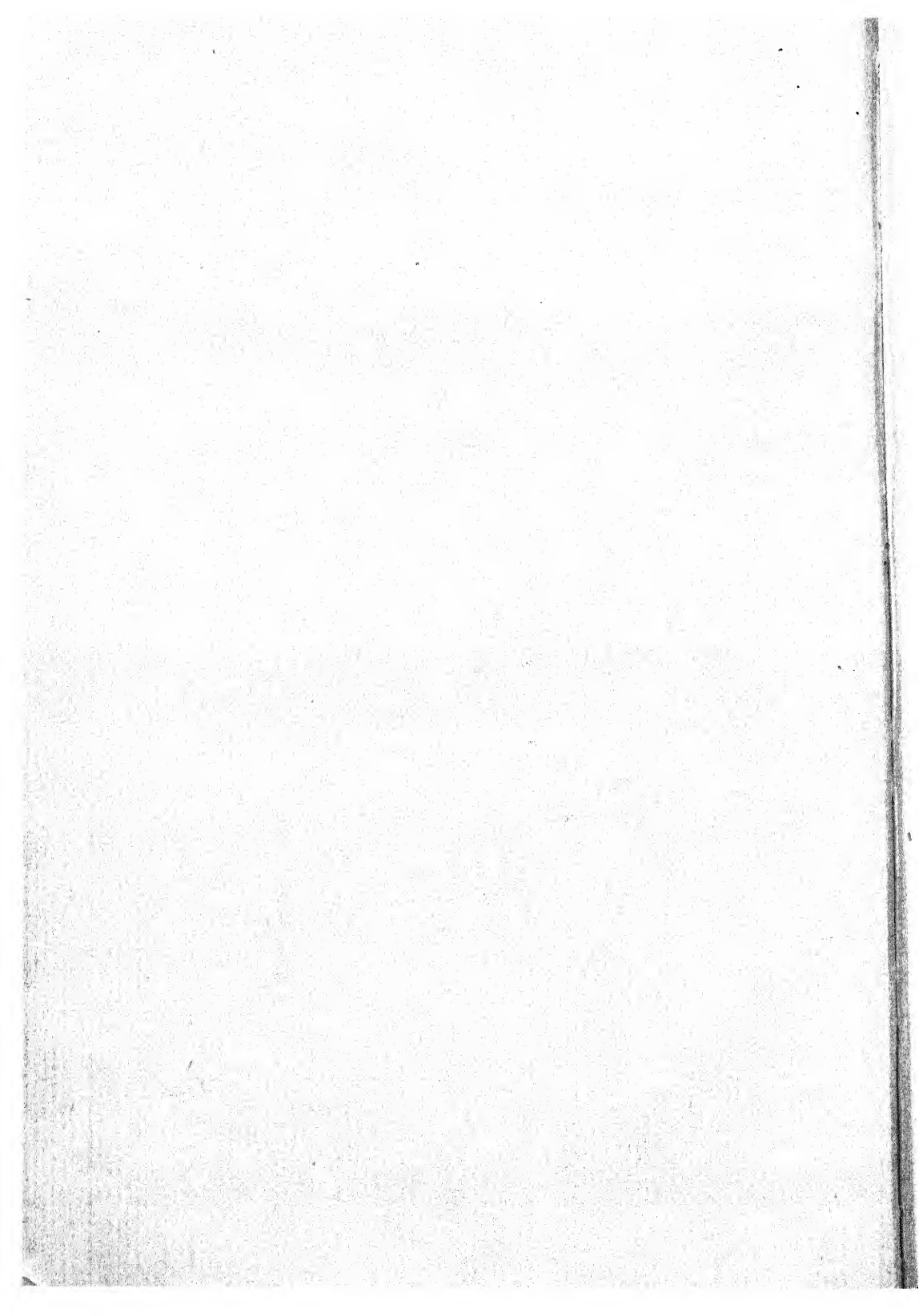
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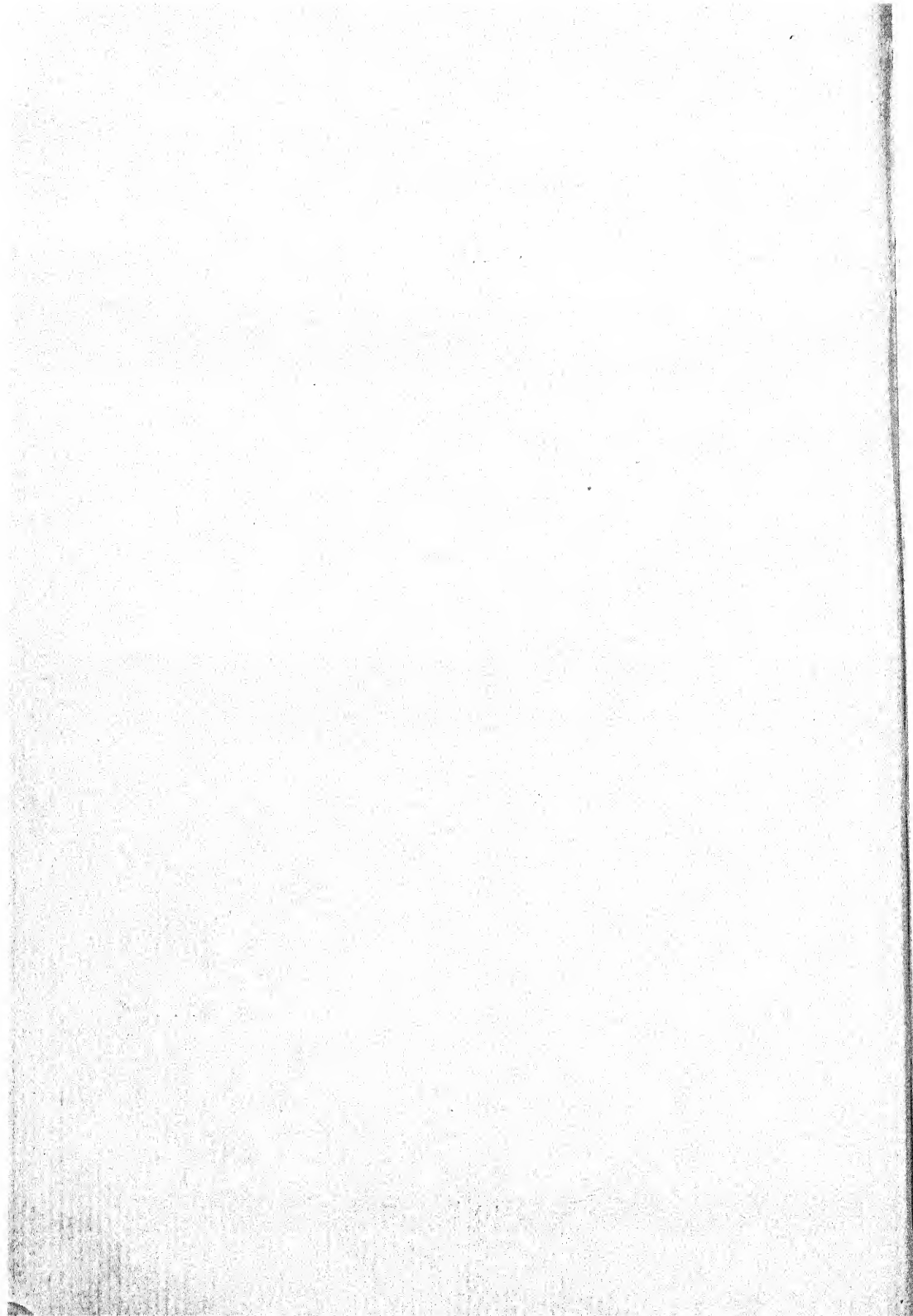
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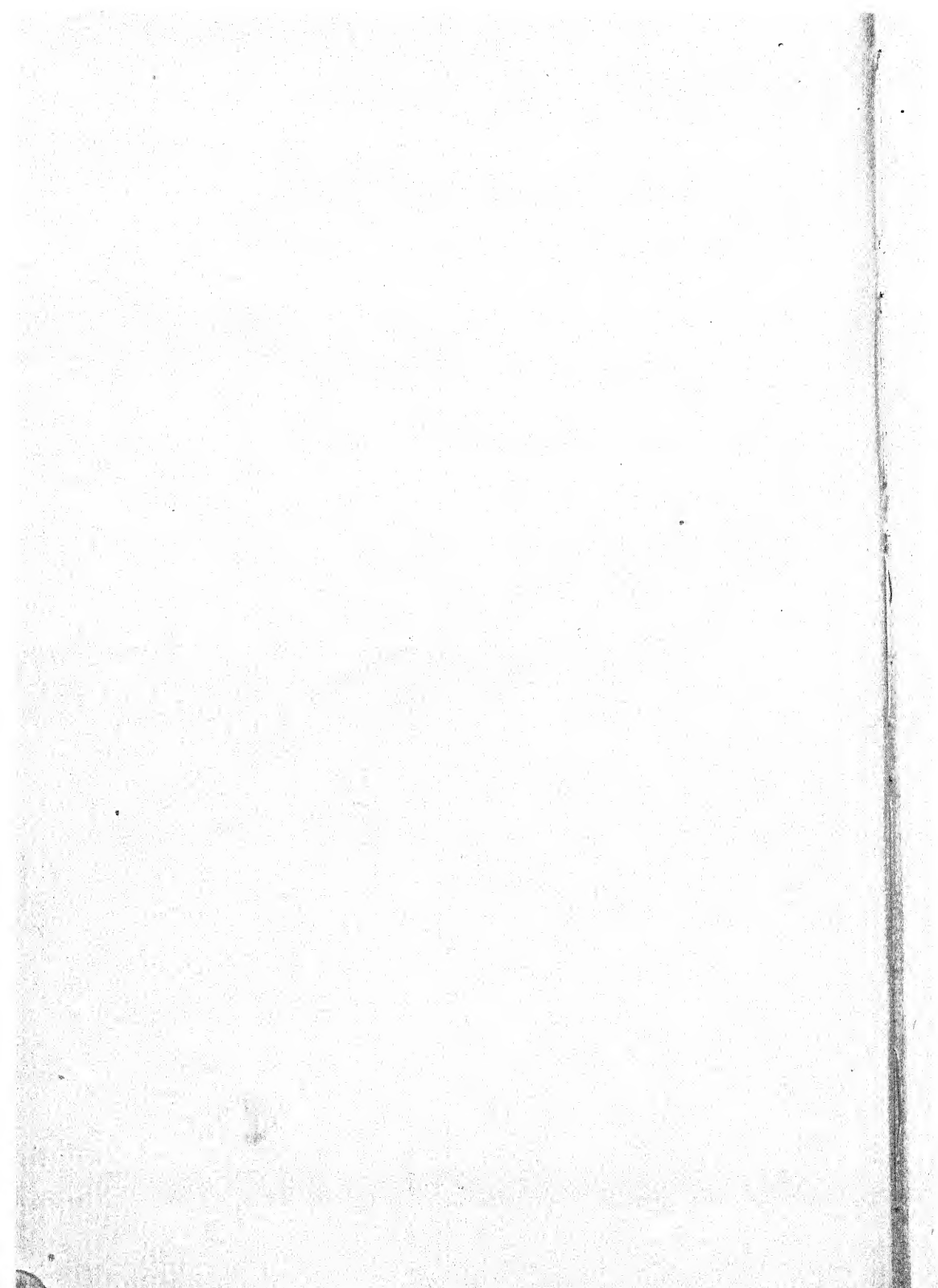
## **FOREWORD**

This compilation by Dr. Schneider of the data on the digestibility of the various feeds throughout the world is a notable undertaking which should be of great service to those interested in animal nutrition and livestock feeding in various countries.

Only a person who has done similar work can entirely appreciate the great amount of time and the unlimited patience that have been required in its accomplishment. As one who has on two different occasions made compilations of the data obtained in this country on the digestibility of our feeding stuffs, I realize thoroughly the great number of hours of painstaking effort that Dr. Schneider and his helpers have spent on the project.

The fact that Dr. Schneider has had the courage to undertake this task and the energy to complete it, gives me personal satisfaction, since his major studies for the Ph. D. degree some years ago were under my direction. Among the greatest sources of satisfaction to any teacher are notable accomplishments by his former students.

F. B. MORRISON





## PREFACE

The references to the digestibility of dry matter or of one or more nutrients of feeding stuffs are among the oldest and most abundant to be found in the literature on animal nutrition. During the past 80 years more than 2,500 publications have appeared in which original digestion experiments have been recorded. In these publications, printed in 17 languages, are contained the results of nearly 25,000 digestion trials. Summaries of digestible nutrients were made within a decade of the beginning of such experiments. Several larger compilations have been made by various workers as follow: Dietrich and Koenig,<sup>1</sup> Jordan and Hall,<sup>1</sup> Lindsey,<sup>1</sup> Fraps,<sup>1</sup> Morrison,<sup>2</sup> and Tiechert.<sup>1</sup> There has been no up-to-date comprehensive summary with bibliographies of this world-wide accumulation of data published recently. This volume contains a compilation of digestion coefficients and chemical composition together with author and feed bibliographies. The interpretation of these data will follow in other publications.

If someone wants to know the digestible nutrient content of a product of the farm, forest, feed mill, or the sea that is new to him, there is always a possibility that an experimenter at *some* time and in *some* part of the world has already provided an answer. A compilation of this vast accumulation of data will give animal husbandry workers, feed producers, manufacturers, and others a source to which they can turn for information about *any* material the digestibility of which has been determined with *any* farm animal.

At the conference on energy metabolism held under the auspices of the Committee on Animal Nutrition of the National Research Council at State College, Pennsylvania, June 14 and 15, 1935, one of the recommendations was as follows:

"Since the existing data on the digestible nutrients of feeding stuffs are in many cases faulty, either because of errors of method or, of technique, and since digestible nutrient values are used in the computation of net energy values, it is recommended that the further study of the digestibility of feeding stuffs, particularly as affected by combination in rations, by plane of nutrition, and by species differences be encouraged in all practicable ways.

"Also, to avoid undesirable duplication of costly experimental work, and to facilitate the diffusion of the available knowledge regarding digestibility

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<sup>1</sup>See list of references on page xi.

<sup>2</sup>Morrison, F. B. Feeds and Feeding, 1936. Morrison, Ithaca, New York.

of feeding stuffs, it is desirable that a comprehensive monograph be prepared on this subject—this monograph to include tabulations of available data, critical analyses of these data with special reference to technique of determination and computation, formulation of a mathematical relation between digestibility and plane of nutrition, and an analytic bibliography of the American and foreign literature.”

Dr. L. A. Maynard, chairman of the Committee on Animal Nutrition of the National Research Council, in a letter to the author dated December 11, 1941, wrote as follows:

“At the meeting of the Committee on Animal Nutrition of the National Research Council held at Chicago on November 27th, it was voted to request you to prepare a monograph dealing with a critical examination of data on the digestibility of feeding stuffs, a critical analysis of techniques, the relationship between digestibility and chemical composition, relation to plane of nutrition, etc.

“The Committee feels that this is a matter of great importance in connection with the nutrition program for defense, and I may add that it seems particularly urgent in the light of happenings since the meeting in Chicago. I hope very much that you will find it possible to accept this task.”

On receipt of this letter the feasibility of undertaking this work was examined with Dr. E. A. Livesay, head of the Department of Animal Husbandry, and Dr. C. R. Orton, director of the West Virginia Agricultural Experiment Station. With their approval the task was begun. The undertaking was outlined as a Furnell project of the Experiment Station. Funds were provided from that source and assistants were employed to extend the work of the author.

Further impetus was given this work by the action of the American Society of Animal Production at its annual meeting on December 1, 1943, in which it passed the following resolution: “The compilation and analysis of existing data on the composition and digestibility of feeding stuffs at present in progress at the West Virginia Agricultural Experiment Station under Dr. B. H. Schneider and initiated at the request of the Committee on Animal Nutrition of the National Research Council will be an important contribution in this field. All measures to hasten the completion of this work are strongly endorsed by the society.”

The final event that placed the project on an adequate basis was the grant-in-aid given by Swift & Company during the calendar years 1944 and 1945. This grant-in-aid over and above the funds already allotted by the Experi-



ment Station provided sufficient financial support so that the work could proceed at an optimum rate. It has made possible the completion of this volume at this time.

Professor Maynard's letter was written four days after the Japanese attack upon Pearl Harbor. There are usually more scarcities during and following wars and greater need for means to alleviate them. Although this publication did not appear in time to serve during the early critical wartime feed shortage, shortages continue none the less, and there still is need for information of this kind, particularly to make the largest use of all feeding stuffs which may be available in any one locality. More information of this type is needed if substitutions of less-known feeding stuffs are to be made for those customarily used in times of abundance. Irrespective of the national or international situation, the need for a comprehensive summary of all work on composition and digestibility of feeding stuffs by farm livestock has been increasing over a period of years.

The present volume is not the contemplated monograph. It is published at this time to bring to light the useful bibliographies and data that have been accumulated while preparing the monograph. There are included at this time only about 900 references and data from approximately 11,000 digestion trials. These sources are all that are available with individual feeding stuffs on the five commonest species of mammalian farm animals. In succeeding publications it is planned to deal with rations, with other species, and with the factors and variables that influence the efficiency of digestion.

The references in the over-all bibliography employed as source material for data recorded in this publication were selected from the following sources: Chemical Abstracts; Biological Abstracts; Nutrition Abstracts and Reviews; Experiment Station Record; the author's card files and those of Dr. H. H. Mitchell in the Division of Animal Nutrition, University of Illinois; references supplied by Dr. N. R. Ellis, Bureau of Animal Industry, United States Department of Agriculture; and citations from the following earlier compilations:

- (1) Dietrich, T., und J. Koenig, 1891. *Zusammensetzung und Verdaulichkeit der Futtermittel.* Julius Springer, Berlin.
- (2) Jordan, W. H., and F. H. Hall, 1900. The digestibility of American feeding stuffs. U. S. Dept. Agr. Office Expt. Sta. Bul. 77, 5-100.
- (3) Lindsey, J. B., H. D. Haskins, P. H. Smith and C. L. Beals, 1919. *Compilations of analysis.* Mass. Agr. Expt. Sta. Spec. Bul., 3-59.
- (4) Fraps, G. S., 1925. *Energy-production coefficients of American feeding stuffs for ruminants.* Texas Agr. Expt. Sta. Bul. 329, 5-62.

- (5) ..... 1928. Digestibility and production coefficients of poultry feeds. Texas Agr. Expt. Sta. Bul. 372, 3-24.
- (6) ..... 1932. Digestibility and production coefficients of hog feeds. Texas Agr. Expt. Sta. Bul. 454, 3-24.
- (7) Keith, M. Helen, 1925. A bibliography of researches bearing on the composition and nutritive value of corn and corn products. Ill. Agr. Expt. Sta. Bul. 257, 3-151.
- (8) Tiechert, E., 1937. Die Bewertung der Futtermittel in der Schweinemast. Landw. Jahrb. 84, 643-739.

These sources were used to obtain the references to the original publications in which the data were first reported. *No data were taken from abstracts or compilations.* During the survey of literature the most recent of each series of publications were reviewed first; all citations made by each author deemed likely to supply data on digestibility, if not already in the over-all bibliography, were added to it.

This publication includes only data on composition and digestibility of individual feeding stuffs determined with the five species of farm animals—cattle, sheep, goats, swine, and horses. Not included are approximately an equal number of digestion trials either with rations or with trials on human subjects, chickens, rabbits, rats, and other species. Digestibility of certain hay mixtures or of other feed mixtures that were grown, stored, and fed together are included.

Early in the work of abstracting references and copying relevant data, criteria were set up by which to select data that were acceptable and to discard those which were not. This classification was made solely on the basis of the experimental techniques used. All data were divided into three classes: (1) Unacceptable data: such data were not copied from the publications; the titles do not appear in the Author Bibliography. (2) Acceptable data. (3) Questionable or marginal data: these latter data were all copied and calculated to a uniform moisture-free basis. Data were placed in the questionable or marginal class if the methods used were not stated or implied by the author or if the methods described were questioned. Whether or not such data were eventually accepted or rejected depended on further evidence, favorable or unfavorable. Many of the data first listed as questionable or marginal eventually were included in the averages if they were not too widely aberrant. The place of certain values in relation to others is made more evident by the method of ranking all values used in these studies. Only composition on the basis of crude protein ( $N \times 6.25$ ) and coefficients

of *apparent* digestibility are included in this compilation. When a nitrogen factor other than 6.25 was employed to estimate crude protein, the data were recalculated and used whenever possible. The only exception to this rule was in the case of milk, in which the prevailing factor of 6.37 was not changed.

In Section I is given the Author Bibliography and in Section II the Feed Bibliography of the researches on composition and digestibility of feeding stuffs. In the Author Bibliography the names and initials of all authors are given with references having four or fewer authors. If there are more than four, only the first three are given, followed by "*et al.*" Three languages are used in the bibliography—English, French, and German. Translated titles are given for all other languages. In German words requiring the umlaut the letter "e" following the vowel is used instead of (¨) over the vowel.

In a few cases identical data appeared in several publications by the same authors. To discover this, the digestion coefficients and percentages were ranked. This put like values together and facilitated their identification. Identical percentages and identical digestion coefficients of all nutrients throughout two or more digestion experiments, in different publications by the same author, are a possibility likely to occur so infrequently that it may be considered impossible. Earnest effort has been made to avoid duplication, two or more publications giving the same data having been grouped together under one citation except when each contains additional data.

Digestibility values when determined indirectly by feeding the feed in question with another and by deducting the estimated effect of the latter in the calculations (commonly called "digestibility by difference") are distinguished from those determined with feeds fed alone *by printing the former in italics*. Italics appear whenever the digestion coefficients were determined "by difference" throughout this publication.

No discrimination regarding data was made in this compilation on the basis of associative digestibility. It is known that the protein content of the basal feed or ration affects the digestibility of the protein of feeds determined by difference. The crude fiber or other percentages of composition of the basal feed or ration may also affect digestibility values that are determined indirectly. Studies of these factors will be presented in later publications.

To make the Author Bibliography more useful for the purpose for which it is intended, the animals used and the feeding stuffs fed follow each reference. After each animal, these feeding stuffs are grouped alphabetically by feed classes—hays first, followed by other dry roughages, green soiling crops,

silages, and concentrates. In the Feed Bibliography (Section II) a like arrangement of feed names is followed, all feeding stuffs from the same plant source being shown in sequence. In this section, however, all species *common names* are listed alphabetically.

The same plan is used also in Section IV, where species common names of *feeding stuffs* are placed alphabetically under each *animal* species. The distinction between roughages and concentrates is frequently a difficult one to make with feeding stuffs other than common farm hay, fodders, grains, and their byproducts. Also, if separate tables or lists had been given for each class of feeds, many feeding stuffs which should be grouped together would be divided. For instance, some fruit-pulp meals are definitely concentrates and should be listed as such if a separation is made, while others are as clearly roughages; yet the person seeking information about them would expect to find them listed together. In the opinion of the author the four tables are less complex and more serviceable when all species common names of feeding stuffs are grouped alphabetically than if the tables for each kind of animal were again subdivided into three or more conventional feed classes. Excessive multiplicity of tables is avoided.

In the Author Bibliography the abbreviations published in United States Department of Agriculture Miscellaneous Publication 337, 1939, *Abbreviations Used in the Department of Agriculture for Titles of Publications*, have been followed insofar as they are given. The names and also the style or form of the names of feeding stuffs have been determined as far as possible by the use of *Standardized Plant Names*, the *Official Publication of the Association of American Feed Control Officials, Inc.*, or the United States Department of Agriculture *Handbook of Official Hay and Straw Standards*, and by the recommendations of botanists, agronomists, and other workers in related fields. It was difficult to identify feeding stuffs in many cases because authors were not sufficiently specific. Some feeding stuffs had to be omitted because they could not be identified clearly.

As far as possible the terms used in the feed industry have been used. For instance, "cottonseed meal, 41% protein" indicates that this minimum percentage of crude protein was contained in the feeding stuff. Translations of the names of feeding stuffs from foreign languages were made with the greatest of care, and considerable review of such literature was necessary to find descriptions of feeding stuffs under the names used by certain foreign authors who did not describe the products in their digestibility studies. Mixtures of various plant species contained in hays, fodders, or silages were arranged alphabetically within the feed name. For instance, "clover timothy

mixed hay" and not "timothy clover mixed hay" has been used. If a non-specific name such as "grass" or "legume" was used with a specific plant name such as "timothy," the specific name was put first. The term "meal" is used throughout instead of the words "cake" or "chips." Linseed oil meal is finely ground linseed oil cake, and the same relationship exists between the oil meals and cakes and chips from other oil seeds. Meadow hay, native hay, prairie hay, etc., are listed under "Hay," which is followed by the geographical source. The latter information should be helpful in identifying the botanical composition, since it will be familiar to those living in the section of the world designated and typical of the naturally seeded hay fields of that locality. Hays described as "dehydrated" mean those artificially dried. "Air-dried" indicates those hays dried indoors by air convection.

The feed names in Section III are those given by the authors in the various publications except as they could be corrected. The plant common and scientific names were checked with *Standardized Plant Names* and with various other botanical references. This section should be used with the other sections to identify feeding stuffs that may be called by common names not familiar to the reader. It may not be amiss to mention that the terms used are American, not English, and "corn" and "alfalfa" rather than "maize" and "lucerne" etc., are used.

Four tables are contained in Section IV, giving composition and digestibility data for feeds fed to cattle, sheep and goats, swine, and horses. It should be noted in Table 2 that sheep and goats are grouped together. Here all data obtained with the latter as experimental animals are indicated by the word "goats" in parentheses. The values given on a moisture-free basis are most useful for the comparison of feeding stuffs. The composition including moisture of feeding stuffs as offered to animals is, however, most valuable in estimating the nutrient content of rations.

Every effort has been made to subdivide feeding stuffs into various qualities or grades whenever the data or the text of the publication supplied information to make this possible. As grains are not graded solely on moisture content, grades as such based only on moisture have not been indicated, but various crops are divided into moisture-percentage groups corresponding to the official U. S. grades. "Sample grade" *can* be indicated solely on this basis, as excess moisture alone is sufficient to place samples in this grade.

Some authors have not published the dry-matter percentages of feeding stuffs. There are fewer percentages for dry matter than for other nutrients in the case of several feeds. An estimate may not cause a serious error with



feeds low in moisture, but in silages and green roughages there is considerable variation. By decreases in moisture the percentages of nutrients may readily be doubled or trebled. Nevertheless, when the dry-matter percentage was not given, it was estimated from other samples of the same or a similar feed. Such estimated dry-matter percentages are shown in parentheses.

It should be emphasized that no digestion coefficients have been recorded unless the chemical composition is also available for the same sample of feed. The average chemical composition given in each case is from the identical feed samples to which the average digestion coefficients pertain. These average analyses, extending from 1864 to the present, may not be typical in all cases of those obtained currently by feed-control laboratories. However, on inspection there appears to be surprisingly little difference with most feeds. The samples reported herein certainly were of kind and quality such that they were offered to and consumed by animals. Significant changes in composition of many feeding stuffs, while believed to have taken place over a period of years, have never been proved to occur except possibly with mill byproducts. Byproduct feeds differ from time to time and from place to place depending on the processes used in manufacturing and on the combination of materials included in any one feed. Most modern mills remove more fat from manufactured feeding stuffs than was the case a few years ago. However, even this tendency will vary depending on the industrial demand for fats and on their market value. Accordingly the composition of feeding stuffs as given by authors is included in the tables without omissions or changes if no errors in technique have been detected. Few data on feeds are forever obsolete in all parts of the world.

Since the beginnings of research by the "balance" method more than a century ago and the inevitable experimentation on methods in the early stages, the techniques have remained fairly uniform. There has been little change during the past 75 years. The importance of a preliminary or adjustment period and of continuing experiments for a sufficient number of days has generally been recognized in the experiments with farm animals. Some early trials were carried out as carefully as any that have been done recently. In fact, it would appear that methods used in digestion trials have been perhaps altogether too static. Minor changes there have been, but basically the methods are the same. The only exception has been the digestion coefficients obtained by the "indicator-substance" method of Edin. Such values have been included. They appear to be equally consistent with those obtained by the conventional method whether silicon dioxide, ferric oxide, or chromic oxide was used.

Further justification for including earlier work, at least for the present, is found in the fact that the only data we have for certain common feeding stuffs is more than 25 years old. There has been a tendency for workers not to repeat digestion trials on common feeds that had been studied thoroughly earlier. Also, if we limited the scope of such investigation geographically, for instance, to any one continent, we should be entirely without digestibility data on many feeding stuffs. It has been a constant surprise to the author to note how concordant data can be that have been obtained at widely separated times and places. The data contained herein have been evaluated and taken without prejudice based on age or distance.

Digestion experiments have been conducted with many and varied chemical entities, such as vitamins, cellulose, lignin, etc. They are not included in this publication. The author shares with many workers the desire that better methods of chemical analysis be devised. Although the present system of proximate analysis may eventually be obsolete, the great body of determinations of ash, crude protein ( $N \times 6.25$ ), crude fiber (Henneberg method), ether extract, and nitrogen-free extract (by difference) cannot be ignored for some years. The use of digestion coefficients with the percentages of such "nutrients" tends to correct the lack of biological applicability of the percentages taken alone. This fact is most evident with feeds in which the fiber is more digestible than the nitrogen-free-extract. However, this failure of existing chemical methods correctly to subdivide carbohydrates on the basis of nutritive value does not change the total digestible nutrients.\*

It may be noted that the average composition of a feed given under one animal of Section IV may be slightly different from that given under another animal species. In such cases the reader may find sufficient subdivision of the composition of those feeding stuffs used in the largest number of digestion trials to decide upon digestibility values applicable to the feeding stuffs of the particular analysis in which he is interested. It may be necessary for the reader who requires more detailed information from the original references regarding certain feeds to evaluate the data from these various sources, make separate studies, and derive more specific values for his own use.

The problem of refused feed is not dealt with in this book. Animals frequently leave uneaten the fibrous or dirty portions of feeding stuffs placed before them. This feed refused often is considerably higher in ash and fiber than that offered. Thus the feed eaten sometimes contains less ash, less

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\*The total digestible nutrient values in Section IV have been calculated by the usual method:

Total digestible nutrients = digestible crude protein + digestible crude fiber + digestible N-free extract + (digestible ether extract  $\times 2.25$ ).

fiber, and more protein than that offered. The composition of the feed eaten as well as the composition of the feed offered to the animals has been recorded for further study. In the present publication the composition of the feeding stuff is given as *offered* to the animal, which is the same as the composition when harvested or as handled in commerce. With certain feeds the product of the digestion coefficient and the latter composition may not represent the actual nutritive value. Also, the latter composition will not be as accurate as the composition of the feed *eaten* in a study of its effect upon digestibility. This is not a serious error in the publication. There may be significant differences in chemical composition *as offered* and *as eaten* with a very few feeding stuffs. In many cases feed is refused only because the animal is offered more than it cares to eat.

Whenever the author gave the information, the feeding stuffs have been designated by the stage of maturity at time of harvest. The following terms have been used: very immature, prebloom, early bloom, half bloom, full bloom, late bloom, milk stage, dough stage, mature, and overripe. With certain crops, or when the authors were not specific, the terms "immature" or "postbloom" have been employed. These are not in all cases the words used by the authors to describe the maturity of feeding stuffs but are believed to be their equivalent. These terms are uniform; the author believes that they are adequate.

These studies and tables have been undertaken with the hypothesis that digestion coefficients are "... measurements indissolubly connected with particular samples with which they are obtained. They must be corrected for differences in chemical composition if applied to other samples of the same feeds and rations . . ."\* It is desirable that the composition of feeding stuffs be representative of those used in practice. If there are not statistically significant average digestion coefficients for feeding stuffs of typical composition, then either digestion experiments must be repeated on typical present-day samples of those feeds, or suitable regression equations must be prepared to correct existing digestion coefficients so that they may be more applicable. In this preliminary publication, and until such regressions have been worked out, if we adhere to our hypothesis, it is possible to apply digestion coefficients only to feed samples with composition similar to those with which the coefficients were obtained.

Some authors have considered negative digestion coefficients and those of over 100 to be impossible. Throughout this publication such values have

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\*Mitchell, H. H., 1942. The evaluation of feeds on the basis of digestible and metabolizable nutrients. *Jour. Anim. Sci.* 1, 159-173.



been treated as reasonable possibilities. If the physiological effect of a feeding stuff tends to stimulate greatly the excretion of metabolic products such as nitrogen or fat, or if it adversely affects the digestibility of the basal ration, the feeding of this material alone or with a basal ration produces a net negative contribution to the animal's economy. The apparent digestion coefficient becomes negative. Likewise, if the feeding stuff greatly increases the digestibility of the basal ration, the net effect of adding this feed material may be favorable for one or more nutrients to an amount of more than 100 percent. When a nutrient is contained in a feeding stuff at a very low level, these phenomena may mean that the variation is far in excess of the amount of the nutrient. In the study of the variation of digestion coefficients that are close to zero, it is only to be expected that some might be negative. Regressions of digestibility on composition continue above and below zero with unmistakably uniform trends. The author cannot conclude otherwise than that negative digestion coefficients and those over 100 are realities not to be ignored. In many cases where authors have supplied necessary detailed data but have reported digestibility as "0" or as "100," the actual negative values and those over 100 have been calculated and used in preparing the tables enclosed herein.

It is recognized that a measure of the variation of the individual values about each mean reported in Section IV would make the tables more valuable to some workers. However, study of the variability of these data has not yet been undertaken. The information contained herein is of value to many without supplying the standard deviation or one of its derivatives. It is better to publish the results of this work to date than to withhold it until later when it will be more complete.

The distinctive features of this publication may be summarized as follows:

- (1) Digestion coefficients determined directly are recorded separately from those determined "by difference."
- (2) Data concerning each animal species are given separately.
- (3) Data were taken only from original publications. No data were taken from the abstracts giving averages or from former compilations.
- (4) Data were copied on an individual-animal basis, whenever available, and evaluated as such. An author's averages were not accepted unless no data for individual animal and individual trial were given.
- (5) Average percentages of composition and average digestion coefficients apply to the same feed samples in all cases. Neither composition nor digestibility data were taken from any publication unless *both* were available.

- (6) Negative digestion coefficients and those over 100 have been used in calculating average digestion coefficients.
- (7) Complete author and feed bibliographies are included so that the reader who is not satisfied with an average given in the tables may make a more detailed study of a certain feed than has been done in preparing them. The reader is invited to reevaluate and redetermine the average composition and the average digestion coefficients to suit his own needs.

It is hoped that this work will be useful to those in animal nutrition research, to general animal husbandmen, to the feed industry, and to scientists and practical workers in related fields. There are some data which the author has omitted because the method and results were questionable. A few data have been omitted because they were unobtainable or were of such recent date as to be precluded. Certain values have been omitted because of errors in simple arithmetic that could not be corrected from data given. There may be other data on digestibility which have been overlooked. If such is the case, the author would appreciate having such publications called to his attention. However, the bibliography is reasonably complete for digestion trials with all proximate nutrients with individual feeding stuffs and with the five species of farm animals. It should be useful to reveal unstudied portions of the field in which further research would be desirable. For instance, there appear to be only eight digestion trials on fish meal with swine which include both protein and fat, and none of these was done in the United States on the type of product produced and sold in this country.

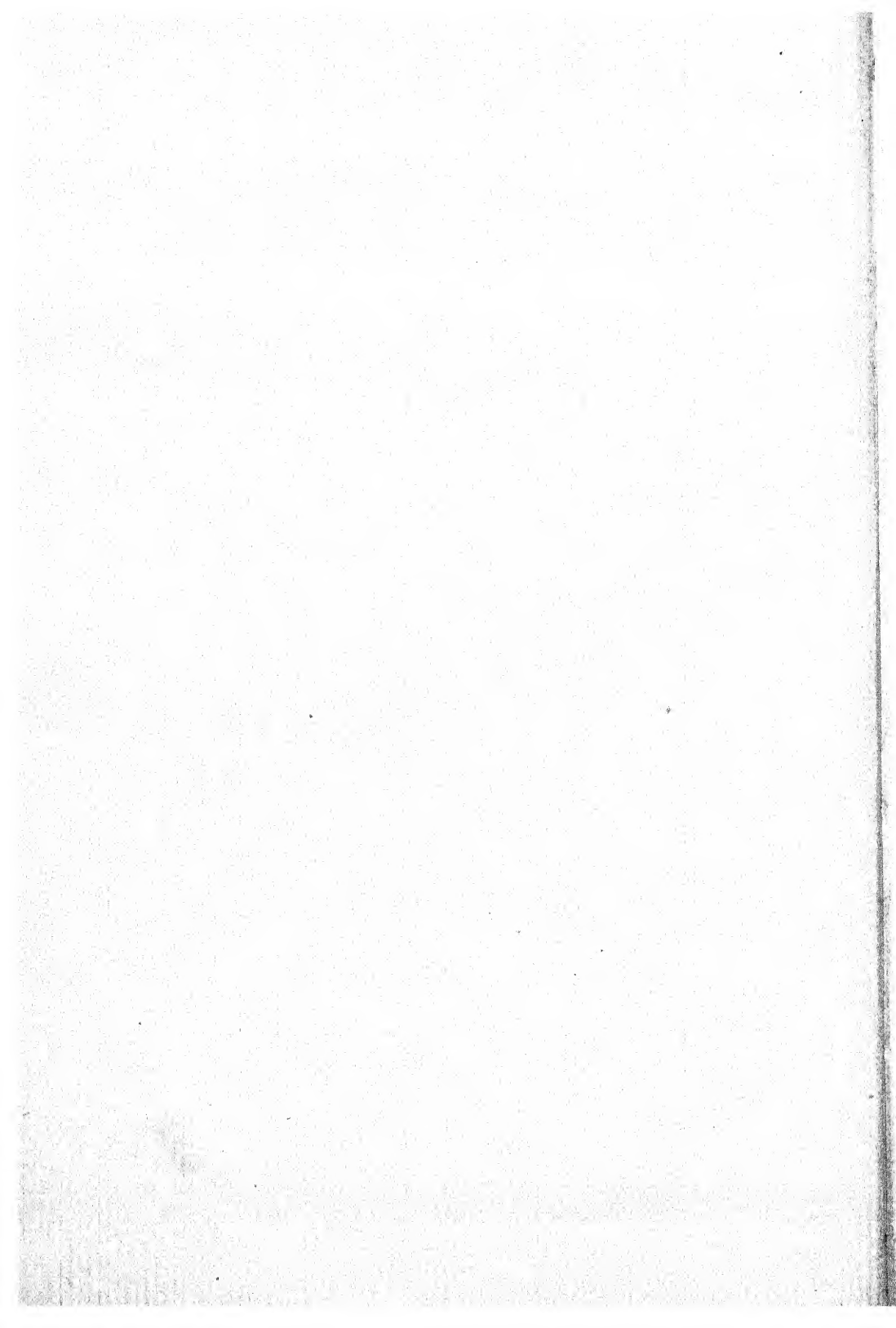
The collection, evaluation, calculation, and coordination of these bibliographies and data have taken the larger part of 3½ years. Along with the technical and clerical assistance this publication represents over 12 man-years of work. As envisaged by those who instigated the undertaking, the entire task is still not complete. The extent of the variability of digestibility with different individuals and species, and the factors which affect it, remain to be investigated. Facts related to these phenomena which may lend considerable evidence toward their solution have been recorded, many in code numbers, in the extensive notes that have been taken. These are in a form quite capable of interpretation. They represent the unfinished task on which work is continuing.

The author owes much to many who helped make this work possible. To the Committee on Animal Nutrition of the National Research Council, at whose request it was begun, particularly to Dr. L. A. Maynard, Dr. H. H. Mitchell, and Dr. E. B. Forbes for their personal interest and advice; to the American Society of Animal Production for its resolution at the annual meet-

ing in 1943, because one needs encouragement from fellow professional workers; to Swift & Company for the grant-in-aid during 1944 and 1945, which makes it possible to present this work at this time; to Director C. R. Orton of the West Virginia Agricultural Experiment Station and to Dr. E. A. Livesay, head of the Department of Animal Husbandry, under whose aegis the work was undertaken, for approval and support; to Professor C. V. Wilson for lending always a willing ear; to Gerald Jenny for painstaking editing; to a number of botanists and agronomists, particularly to Dr. W. A. Dayton and to *Standardized Plant Names* for aid in identification of plant materials; to many authors who carefully and promptly answered questions to clarify their publications; to the tireless service and bibliographical advice of many librarians, especially those in the libraries of West Virginia University, the University of Illinois, and the United States Department of Agriculture; to the several assistants who gave conscientiously of their time and effort—three young men who entered their country's service—Harry Hannon, Vance Ahlf, and Vernon Fisher; to Miss Helen Pavlech, who served faithfully and longer than any other; to Dr. Alfred Jospe, Dr. Victor J. Lemke, Professor J. C. Saposnekow, Mrs. Loraine Dibble, Mrs. Rehane Barjansky, Miss Mary Ann Cipolloni, and others who assisted in abstracting and translating; to Dr. F. D. Cornell and Miss Margaret Cross for the use of the International Business Machine and for the careful punching and manipulation of the cards in calculating voluminous data; to the makers of the International Business Machine for an unexcelled means of handling millions of digits; to Mrs. Joyce Nebergall, Mrs. Marvel Bennett, Mrs. Elaine New, Mrs. Virginia Mahanna, and others for long hours of exacting clerical work; to these belongs credit for the completed task.

BURCH HART SCHNEIDER

Morgantown, West Virginia  
July 1945



## **DIRECTIONS FOR USING THE BIBLIOGRAPHY AND THE TABLES**

This publication consists of four sections as follow:

### **SECTION I**

Section I, the Author Bibliography, gives a list of references, each followed by names of the animal species and of the feeding stuffs used in the experiments. Animals listed are cows, steers, sheep, goats, swine, and horses. Because of the distinctive interest of dairymen, sex difference is designated with cattle in this section. A very few trials with bulls were encountered, but in the system of coding used they were not distinguished from steers. Under each entry the feeding stuffs fed to each animal are listed alphabetically within each feed class in the following order: hays, other dry roughages, green roughages and roots, silages, and concentrates. Most authors worked with only one or two of these feed classes.

### **SECTION II**

Section II, the Feed Bibliography, consists of a list of feeding stuffs, their species common names arranged alphabetically. The various feeds from the same plant source are listed together (in most cases) and in the same order as that under each author in Section I. Each feeding stuff is followed by the alphabetically arranged citations to the references of Section I including authors' surnames, years of publication, and type of animal worked with—cows, steers, sheep, goats, swine, or horses. The form of the feed name is that of the *Official Publication of the Association of American Feed Control Officials, Inc.*, for concentrates, and the *Handbook of Official Hay and Straw Standards* (United States Department of Agriculture) for roughages as far as is consistent and possible with alphabetical filing and with clear designation of numerous products from the same plant sources.

### **SECTION III**

Section III, the Common Names and the Scientific Names of plant and animal sources of feeding stuffs, arranged alphabetically, can assist in identifying a feeding stuff which is called by a common name unfamiliar to the reader. *Standardized Plant Names* was taken as the authority for most plant names, although different common names are used in a few instances. If the common plant name under consideration does not appear alphabetically at the left-hand margin of Section II or of any of the tables of Section IV

because it is not the first-named feed of a mixture, a supplementary statement is given in parenthesis. Note, *e.g.*, the reference to "Bermudagrass knotgrass mixed hay" under "Knotgrass." Also, Section III gives a number of common plant names other than those used in Sections II and IV along with the reference to the common name that has been used (*e.g.*, "Berseem. See clover, Egyptian").

### SECTION IV

Section IV, Composition and Digestibility of Feeding Stuffs, consists of four tables as follows:

Table I, Composition of Feeding Stuffs and Digestibility with Cattle. In this table are combined all data obtained in trials with cows, steers, and bulls.

Table II, Composition of Feeding Stuffs and Digestibility with Sheep and Goats. Goats are included with sheep. Data obtained with *goats* are so indicated on each line.

Table III, Composition of Feeding Stuffs and Digestibility with Swine.

Table IV, Composition of Feeding Stuffs and Digestibility with Horses.

In all tables the species common names of all feeds are arranged alphabetically. The feed classes are arranged for each plant species in the same order as under each author in Section I—hays, other dry roughages, green roughages and roots, silages, and concentrates. This plan as a rule places together all feeding stuffs from the same plant species. Comparisons can readily be made between hay, straw, green soiling crops, silage, or various concentrates made from the same plant. The digestible nutrients and the composition on a moisture-free basis (the right-hand page of the tables) permits such comparison. The same data expressed on the basis "as offered to animals" (the left-hand page of the tables) facilitates calculation of the amount of nutrients supplied in a given weight of feed containing a normal amount of moisture.

The columns for ash, nutritive ratio, and digestion coefficient of organic matter are given because they represent information useful for certain purposes which would convey a better concept of a feeding stuff to persons accustomed to their use.

### GENERAL DIRECTIONS

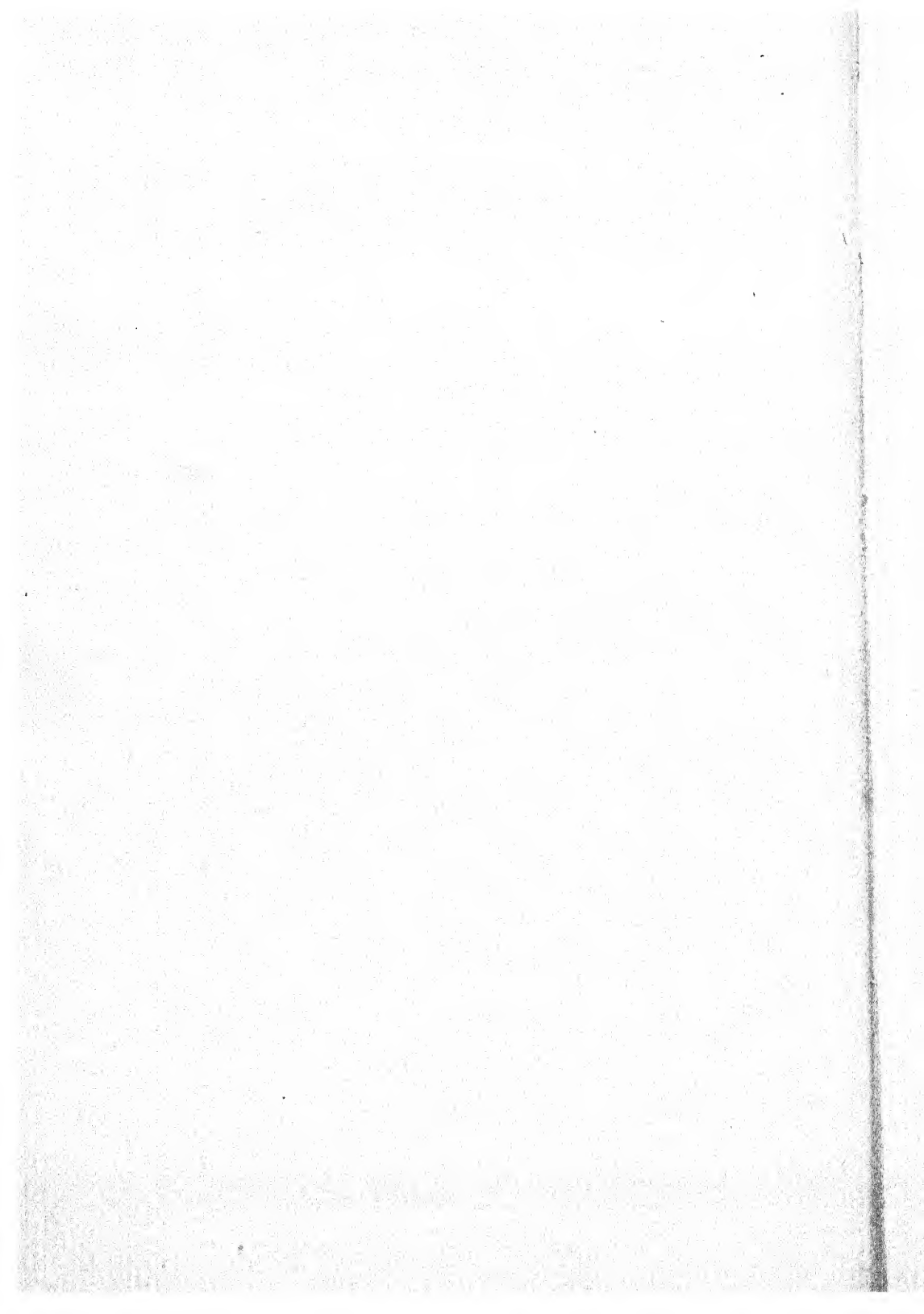
*Italics* are used to indicate *digestibility determined by difference* in all tables *and* in the bibliographies. A feed name and data not in italics indicate that the feeding stuff was fed alone.



Feeding stuffs such as "hay" or "grass", undesignated, are described somewhat by indicating their geographical origin (*e.g.*, "Hay, meadow, Europe"). Such plant mixtures are assumed to be characteristic of the botanical flora which grows without cultivation in the given area.

Section IV contains no cross references. These may be found for common plant species names in Section III and for other differences in feeding stuffs in Section II. If the reader does not find a feed listed by the name which he has in mind in one of the tables in Section IV, it is possible that the feed can be found under another *common name* or under another *animal* by consulting Sections II and III.







## SECTION I

### AUTHOR BIBLIOGRAPHY OF RESEARCHES ON THE DIGESTIBILITY AND COMPOSITION OF FEEDING STUFFS

- ADAMS, A. F. R., AND H. E. GARRETT, 1940. Metabolism trials with New Zealand feed-stuffs. 1. Rye-grass straw. 2. Rape. New Zealand Jour. Sci. and Technol. (A). 22, 146-151, 221-228. Sheep: ryegrass straw; rape, fed green.
- ANDERSEN, A. C., AND J. E. WINTHER, 1934. On the determination of digestibility by Edin's so-called indicator method. (Denmark) K. Vet. og Landbohøjskole Lab. Landøkonom. Forsøg. Beret. 155, 117-154. Cows: clover hay; clover silage, red; clover grass mixed silage; soybean oil meal, hydraulic or expeller process; sunflower seed oil meal, hulls removed; sunflower seed oil meal, with hulls; wheat bran.
- ANONYMOUS, 1968. Composition and digestibility of hay from sewage-irrigated meadows. L'Agricoltura Moderna (Milan) 14, 184-185. Sheep: hay, sewage-irrigated, Europe.
- APLIN, R. D., AND H. B. ELLENBERGER, 1927. Effect of feeding cocoa meal to milking cows. Vt. Agr. Expt. Sta. Bul. 272, 3-19. Cows: cocoa meal.
- ARCHIBALD, J. G., 1926. The composition, digestibility and feeding value of hydrolyzed sawdust. Jour. Dairy Sci. 9, 257-271. Sheep: wood sawdust, treated with HCl, dry; wood sawdust residue after treatment with HCl, dry.
- ARKELL, T. R., 1911. Feeding sheep and lambs: clover hay vs. native hay; turnips vs. dry ration. N. H. Agr. Expt. Sta. Bul. 152, 3-19. Sheep: hay, New England.
- ARMSBY, H. P., 1885. Digestion experiments. Amer. Jour. Sci. 29, 353-369. Sheep: clover hay; cottonseed meal; malt sprouts.
- 1888. Composition and digestibility of corn stover. Pa. Agr. Expt. Sta. Bul. 3, 3-16. Steers: corn stover, dry.
- 1891. Influence of variety and of rate of seeding on the yield of silage corn. Pa. Agr. Expt. Sta. Bul. 15, 3-13. Sheep: corn fodder, fed green.
- 1892. The food value of forage corn. Pa. Agr. Expt. Sta. Ann. Rpt., 22-34. Sheep: corn fodder, fed green.
- 1898. The maintenance ration of cattle. Pa. Agr. Expt. Sta. Bul. 42, 7-188. Steers: clover heavy timothy mixed hay; timothy hay; timothy grass weeds mixed hay.
- AND W. H. CALDWELL, 1888. Nutritive value of pasture grass. Pa. Agr. Expt. Sta. Ann. Rpt., 60-77. Cows: grass mixed, immature dried; grass mixed pasture, Eastern United States.
- 1889. Digestibility of corn fodder and silage. Pa. Agr. Expt. Sta. Bul. 9, 3-16; 1889, Pa. Agr. Expt. Sta. Ann. Rpt., 113-137. Steers: corn fodder, dry; corn silage.

## ARMSBY, continued

- W. FREAR, W. H. CALDWELL, AND F. L. HOLTER, 1889. Digestion experiments. Pa. Agr. Expt. Sta. Ann. Rpt., 67-97. Steers: bluegrass, Kentucky, white clover mixed pasture. Sheep: corn fodder, fed green; corn fodder, sweet, fed green; sorghum fodder, sorgho or sweet, fed green.
- AND J. A. FRIES, 1903. The available energy of timothy hay. U. S. Dept. Agr. Bur. Anim. Indus. Bul. 51, 9-77; 1903, Pa. Agr. Expt. Sta. Ann. Rpt., 96-178. Steers: timothy hay.
- ——— 1905. Energy values of red clover hay and maize meal. U. S. Dept. Agr. Bur. Anim. Indus. Bul. 74, 7-64; 1905, Landw. Jahrb. 34, 861-923; 1905, Pa. Agr. Expt. Sta. Ann. Rpt., 124-179. Steers: clover hay, red, 2d cutting; corn, grain.
- ——— 1908. The available energy of red clover hay. U. S. Dept. Agr. Bur. Anim. Indus. 101, 7-61; 1907, Pa. Agr. Expt. Sta. Ann. Rpt., 94-159. Steers: clover hay, red.
- ——— 1911. The influence of type and of age upon the utilization of feed by cattle. U. S. Dept. Agr. Bul. 128, 11-245; 1910, Pa. Agr. Expt. Sta. Ann. Rpt., 324-606; 1912, Landw. Jahrb. 43, 1-176. Steers: clover, red, timothy mixed hay; timothy hay; *wheat bran*.
- ——— 1915. Net energy values of feeding stuffs for cattle. Jour. Agr. Res. 3, 435-499. Steers: alfalfa hay; clover hay, red; clover, red, timothy mixed hay; timothy hay; *timothy hay*; corn stover, dry; corn, grain; hominy feed; *wheat bran*.
- ——— 1917. Energy values of hominy feed and maize meal for cattle. Jour. Agr. Res. 10, 599-613. Steers: clover timothy mixed hay; corn, grain; hominy feed.
- ——— 1918. The net energy values of alfalfa hay and of starch. Jour. Agr. Res. 15, 269-286. Steers: alfalfa hay; starch, corn.
- ——— AND W. W. BRAMAN, 1916. Energy values of red-clover hay and maize meal. Jour. Agr. Res. 7, 379-387. Steers: clover hay, red; corn, grain.
- ——— AND E. H. HESS, 1894. Cottonseed feed for dairy cows. Pa. Agr. Expt. Sta. Ann. Rpt. 20, 44-63. Steers: cottonseed hulls, with some meal.
- ARNOLD, C., 1885. Fuetterungsversuche mit getrockneten Biertraebern. Jahresbericht der Koeniglichen Thierarzneischule zu Hannover, 17th Bericht, 111-120. Sheep: hay, meadow, Europe; *brewers' dried grains*.
- AULD, S. J. M., 1913. Digestibility experiments with sheep. Para rubber seed cake. Jour. Agr. Sci. 5, 429-433. Sheep: rubber seed oil meal.
- AXTMAYER, J. H., C. J. ASENJO, AND D. H. COOK, 1938. The nutritive values of some forage crops of Puerto Rico. I. Grasses. Puerto Rico Univ. Jour. Agr. 22, 95-121. Sheep: corn fodder, fed green; gamagrass, Guatemala, 1st cutting, fed green; gamagrass, Guatemala, 2d cutting, fed green; Guineagrass, fed green; molassesgrass, fed green; napiergrass, fed green; Paragrass, fed green.
- G. R. HERNANDEZ, AND D. H. COOK, 1938. The nutritive values of some forage crops of Puerto Rico. II. Legumes, grasses and a mixture. Puerto Rico Univ. Jour. Agr. 22, 455-481. Sheep: napiergrass, fed green; napiergrass pigeon-pea mixed fodder, fed green; molassesgrass, fed green; pigeonpea fodder, fed green; soybean fodder, fed green; velvetbean vines, fed green.

## AXTMAYER, HERNANDEZ, AND COOK, continued

- 1940. The nutritive value of some forage crops of Puerto Rico. Puerto Rico Univ. Jour. Agr. 24, 1-34. Sheep: alfalfa hay; cowpea fodder, fed green; napiergrass, fed green; napiergrass pigeonpea mixed fodder, fed green; molassesgrass, fed green; Paragrass, fed green; Paragrass pigeonpea mixed fodder, fed green.
- BARNSTEIN, F., 1914. Die Schwertbohne (*Canavalia ensiformis*). Landw. Vers. Sta. 85, 113-122. Sheep: hay, meadow, Europe; jackbeans, seed.
- UND J. Volhard, 1907. Ueber die Verdaulichkeit der Gerstengraupenabfaelle. Landw. Vers. Sta. 65, 221-236. Sheep: barley feed; barley flour.
- BARTLETT, J. M., 1889. Composition and value of various feeding stuffs. Maine Agr. Expt. Sta. Ann. Rpt., 57-68. Sheep: peas, seed; wheat bran; wheat flour middlings.
- 1897. Digestion experiments. Maine Agr. Expt. Sta. Ann. Rpt., 141-158. Sheep: timothy grass weeds mixed hay; corn silage, flint; corn, flint, sunflower head horsebean mixed silage; corn, flint, sunflower horsebean mixed silage; corn, grain; milk, skimmed, gravity.
- 1898. Digestion experiments with sheep. Maine Agr. Expt. Sta. Ann. Rpt., 79-92. Sheep: oat hay; linseed oil meal, old process.
- 1909. Digestion experiments with sheep. Maine Agr. Expt. Sta. Bul. 67, 133-168. Sheep: clover hay, alsike; oat pea mixed hay; oat vetch mixed hay; timothy grass weeds mixed hay; clover silage, alsike; oat pea mixed silage; corn, grain; corn germ meal; oats, grain; wheat bran and screenings.
- 1904. Digestion experiments with sheep and steers. Maine Agr. Expt. Sta. Bul. 110, 185-204; 1904, Maine Agr. Expt. Sta. Ann. Rpt., 185-204. Steers: clover heavy timothy mixed hay; timothy hay; timothy grass weeds mixed hay; corn fodder, dry; corn silage; corn soybean mixed silage; wheat bran; wheat mixed feed. Sheep: clover hay; clover heavy timothy mixed hay; timothy hay; timothy grass weeds mixed hay; corn fodder, dry; clover silage; corn silage; corn light soybean mixed silage; cottonseed feed; cottonseed meal; wheat bran.
- 1905. Low-grade and high-grade cottonseed meals. Maine Agr. Expt. Sta. Ann. Rpt.; 1905, Maine Agr. Expt. Sta. Bul. 115, 71-76. Sheep: cottonseed feed; cottonseed meal.
- BASELER, K., 1936. Die Ertraege an Roh- und verdaulichen Naehrstoffen von Klee und Wiesengras bei verschiedenen Werbungsmethoden. A. Trocknung: mechanisch verlustlos, am Erdboden, auf Dreibockreitern, Allgaeuer und Steinacher Huetten, Duennndrahtreutern. B. Einsaeuerung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 8, 509-544. Sheep: clover hay, red, 1st cutting; clover hay, red, 1st cutting, dried on riders; clover hay, red, 1st cutting, air dried; clover hay, red, 2d cutting; clover hay, red, 2d cutting, dried on riders; clover hay, red, air dried; hay, meadow, Europe; hay, meadow, air dried, Europe; hay, meadow, 1st cutting, dried on riders, Europe; hay, meadow, 2d cutting, Europe; hay, meadow, 2d cutting, dried on riders, Europe; clover silage, red, 1st cutting; clover silage, red, 2d cutting; grass silage, Europe.
- BEACH, C. L., 1906. The facility of digestion of foods a factor in feeding. Conn. Agr. Expt. Sta. Bul. 43, 1-23. Cows: hay, New England; corn, grain.
- BEALS, C. L., AND J. B. LINDSEY, 1916. Chemical composition, digestibility, and feeding value of vegetable-ivory meal. Jour. Agr. Res. 7, 301-320. Sheep: ivory nut meal.
- BECHTEL, H. E., F. W. ATKESON, AND J. S. HUGHES, 1943. Brown silage from Atlas Sorgo—Chemical composition and apparent digestibility as determined by feeding dairy cows. Jour. Anim. Sci. 2, 295-303. Cows: sorghum silage, sorgho or sweet.

BECKER, M., M. von SCHLEINITZ, UND E. LAGNEAU, 1939. Versuche ueber kuenstlich getrocknetes Gruenfutter. Zuechtungskunde 14, 51-58. Sheep: alfalfa hay, dehydrated; bean hay, green dehydrated; bean hay meal, green dehydrated. Goats: Alfalfa hay; alfalfa hay, dehydrated.

BENEDICT, F. G., AND E. G. RITZMAN, 1923. Undernutrition in steers; its relation to metabolism, digestion and subsequent realimentation. Carnegie Inst. Wash. Pub. 324, 333. Steers: timothy grass weeds mixed hay.

BIZER, E., 1940. Untersuchungen ueber den Futterwert und die Futterwirkung von getrockneter Kartoffelpuelpel bei der Fuetterung an landwirtschaftliche Arbeitspferde unter verschiedenen Grundfuttermitteln. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 217-257. Horses: Alfalfa, fed green; potato pulp, raw, pressed, dried.

BLECHSCHMIDT, H., 1933. Experimentaluntersuchungen und Ermittlungen ueber die Ernaehrung des Pferdes auf der Weide. Landw. Jahrb. 77, 463-560. Horses: grass mixed, pasture, Europe.

BOLLMANN, W., 1932. Untersuchungen ueber die Verdaulichkeit der Naehrstoffe von rohen, gedaempften und gedaempfteingesauerten Kartoffeln am Schwein, am Hammel, an der Milchkuh, und am Mastochsen. Inaug. Diss. Tierzucht. Institut. Koenigsberg, 1-32; 1932, Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol., 329-358. Cows: potatoes, tubers; potatoes, cooked; potato silage, steamed. Steers: potatoes, tubers; potatoes, cooked; potato silage, steamed. Swine: potatoes, tubers; potatoes, tubers; potatoes, cooked; potatoes, cooked; potato silage, steamed; potato silage, steamed.

BONDI, A., AND C. MEYER, 1940. Chemical composition and digestibility of Palestinian cattle fodder. Palestine Agr. Res. Sta. Jewish Agency, Rehovot Bul. 27, 3-68. Cows: oat vetch mixed fodder, fed green. Sheep: oat light vetch mixed hay; vetch hay, common; alfalfa, fed green; clover, Egyptian, 1st cutting, fed green; clover, Egyptian, 2d cutting, fed green; clover, Egyptian, 3d and later cutting, fed green; cowpea fodder, fed green; horsebean fodder, fed green; peavine fodder, fed green; lupine fodder, sweet, fed green; mallow, fed green; millet fodder, foxtail, fed green; pea fodder, fed green; sunflower fodder, fed green; teff grass, fed green; vetch, bitter, fed green; vetch, common, fed green; vetch, Narbonne, fed green; barley, grain; carob seeds; carob pods; peavine seed, grass; sorghum grain, durra; vetch seed, black bitter.

——— 1942. The digestibility of citrus feeds. Empire Jour. Expt. Agr. 10, 93-95. Sheep: orange culls; orange pulp silage; orange pulp silage.

BORMANN, J. E., AND M. LYCZYNSKI, 1933. Experiments on digestibility and fodder yields of grass, alfalfa, and grass-grain mixed fodder. Roczn. Nauk. Rolnicz. i Leśnych (Polish Agr. and Forest Ann.) 29, (1) 45-50. Swine: alfalfa, fed green; barley oat pea vetch mixed fodder, immature, fed green.

BOTHA, J. P., 1938. The digestibility and nutritive value of karoo pasture plants. Farming in South Africa 13, 63-65, 100-103, 140-143, 162-163, 198-199, 234-237, 304-307, 358, 369, 385, 408-409, 431. Sheep: lovegrass hay, Lehmann; chaenotoma fodder, dry; felicia fodder, roughleaf, dry; kangaroo grass, dry; karroobush, dry; sheepbush, Australian, dry; sheepbush, ballhead, dry; tripteris fodder, thick-wing, dry; kangaroo grass, fed green; kaliharigrass, fed green; tetragonia, bush, fed green.

BRIGL, P., UND O. BENEDICT, 1933. Ueber den Einfluss von Asparagin und Betain auf den N-Stoffwechsel des Wiederkauers. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 5, 532-553. Sheep: clover hay, red.

BROWN, L. S., 1922. The utility of yucca and chamiza as range supplements. I. Soapweed (*Yucca elata*). II. Chamiza (*Atriplex canescens*). N. Mex. Agr. Expt. Sta. Bul. 133, 3-38. Cows: soapweed fodder; saltbush, fourwing, fed green.

- BROWNE, C. A., JR., 1904. The chemical composition and feeding value of rice products. La. Agr. Expt. Sta. Bul. 77 (Second Series), Part 3, 430-458; 1903, La. Planter 30, 383-385. Steers: rice bran; rice polishings.
- BRUEMMER, E., 1940. Untersuchungen ueber die zweckmaessigste Konservierungsmethode der Luzerne. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 77-128. Sheep: alfalfa hay, dehydrated; alfalfa hay, dried on riders; hay, meadow, Europe; *alfalfa silage; alfalfa silage, PCls added; alfalfa silage, sugar added.*
- BRUENE, F., K. RICHTER, UND K. E. FERBER, 1932. Ueber den Einfluss der Schnittzeit auf den Ertrag der Hochmoorwiesen und den Naehrstoffgehalt des Hochmoorheues. Landw. Jahrb. 76, 767-782. Sheep: bluegrass, Kentucky, white clover, mixed immature dried; bluegrass, Kentucky, white clover, mixed hay.
- BRUNNICH, J. C., AND U. S. RAWSON, 1921. Digestibility of fodders. Queensland Agr. Jour. 15, 195-198, 235-238. Sheep: alfalfa hay; *hay, bush, Queensland.*
- BUCKLEY, S. S., L. B. BROUGHTON, AND R. H. RUFFNER, 1912. Test of oat hulls. Md. Agr. Expt. Sta. Bul. 168, 22-27. Steers: *oat hulls.*
- BUELOW, K., 1900. Beitrag zur Bestimmung der resorbierbaren Eiweissstoffe in Futtermitteln. Jour. f. Landw. 48, No. 1, 1-38. Sheep: clover hay; hay, meadow, Europe; *beet silage, sugar, roots; beet pulp, wet; tankage; poppy seed oil meal; wheat bran.*
- BUENGER, H., UND E. FISSMER, 1941. Fuetterungsversuche mit Mohnextraktionsschrot an Milchkuehen. Ztschr. f. Tierernaehrung u. Futtermittelk. 6, 65-78. Sheep: hay, meadow, Europe; *poppy seed oil meal.*
- W. HARRE, UND H. SCHMIDT, 1939. Fuetterungsversuche mit kuenstlich getrockneten Suesslupinen-Gruenfutter an Milchkuehen. Ztschr. f. Tierernaehr. u. Futtermittelk. 2, 134-149. Sheep: brome hay, smooth; *lupine hay, sweet, dehydrated; bean oat pea heavy vetch mixed hay, dried on riders.*
- J. SCHULTZ, H. AUGUSTIN, UND H. FINZENHAGEN, 1935. Verdaulichkeit und Futterwert von Wickengemengeheu aus sog. Landsberger Gemenge. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 278-280. Sheep: clover, crimson, ryegrass vetch mixed hay.
- E. FISSMER, UND H. FINZENHAGEN, 1935. Verdaulichkeit und Futterwert von Markstammkohl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 275-277. Sheep: kale, marrow, fed green.
- A. WERNER, P. GLET, ET AL., 1933. Anbau und Fuetterungsversuche mit Markstammkohl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 5, 450-468. Sheep: kale, marrow, fed green.
- J. SCHULTZ, UND J. KESELING, 1933. Verdaulichkeit und Futterwert des Markstammkohls. Zuechtungskunde 8, 168-170. Sheep: kale, marrow, fed green.
- BURKE, W., G. E. SMITH, AND M. J. BLISH, 1917. Studies on the composition and nutritive value of clover hay and clover silage in Montana. Mont. Agr. Expt. Sta. Bul. 117, 59-72. Steers: clover hay; *clover silage; clover silage, 2d cutting.*
- BURKITT, W. H., 1940. The apparent digestibility and nutritive value of beardless wheatgrass at three stages of maturity. Jour. Agr. Res. 61, 471-479. Sheep: wheatgrass, beardless bluebunch, fed green.



CAMBURN, O. M., H. B. ELLENBERGER, C. H. JONES, AND G. C. CROOKS, 1942.

The conservation of alfalfa, red clover, and timothy nutrients as silages and as hays. Vt. Agr. Expt. Sta. Bul. 494, 1-40. Cows: alfalfa hay; alfalfa hay, dehydrated; alfalfa hay, 2d cutting; clover hay, red; clover hay, dehydrated; timothy hay; timothy hay, dehydrated; alfalfa silage, sun-wilted; alfalfa silage, sun-wilted, molasses added; alfalfa silage,  $H_2PO_4$  added; clover silage, red; clover silage, red, sun-wilted; clover silage, red,  $H_2PO_4$  added; clover silage, red, molasses added; timothy silage, sun-wilted; timothy silage, sun-wilted, molasses added; timothy silage, molasses added; timothy silage,  $H_2PO_4$  added.

————— 1944. The conservation of alfalfa and timothy nutrients as silages and hays. Vt. Agr. Expt. Sta. Bul. 509, 1-31. Cows: alfalfa hay; alfalfa hay, dehydrated; timothy hay; timothy hay, dehydrated; alfalfa silage; alfalfa silage, sun-wilted, A. I. V.; alfalfa silage, sun-wilted, molasses added; alfalfa silage,  $H_2PO_4$  added; timothy silage, sun-wilted; timothy silage, sun-wilted, molasses added; timothy silage, molasses added; timothy silage, A. I. V.; timothy silage,  $H_2PO_4$  added.

CARBERY, M., I. CHATTERJEE, AND M. A. HYE, 1934. Studies on the determination of digestibility coefficients. I. A new method of experimentation and computation for directly obtaining the digestibility coefficients of individual feed nutrients in a mixed ration. Indian Jour. Vet. Sci. and Anim. Husb. 4, 295-340. Steers: rice straw; *rice straw*; *linseed oil meal*, *old process*.

CAVE, H. W., W. H. RIDDELL, AND J. S. HUGHES, 1936. The digestibility and feeding value of Russian thistle hay. Jour. Dairy Sci. 19, 285-290. Cows: Russianthistle, tumbling, dry.

CHRIST, H., 1934. Stoffwechselversuche an Wiederkäuern (Sojabohnenschrot, Mischfutter und Zuckerschnitzel.) Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 29, 67-84. Goats: hay, meadow, Europe; *beets*, *sugar*, *roots*, *dried*; *beet pulp*, *dried*; *soybean oil meal*, *solvent process*.

CHRISTENSEN, F. W., AND T. H. HOPPER, 1932. Effect of weathering and stage of maturity on the palatability and nutritive value of prairie hay. N. Dak. Agr. Expt. Sta. Bul. 260, 3-55. Steers: hay, prairie, North Dakota.

————— 1936. Digestible nutrients and metabolizable energy in Russian thistles in light and heavy wheat and barley and emmer. Amer. Soc. Anim. Prod. Proc., 279-282. Sheep: alfalfa hay, leafy; Russianthistle, tumbling, dry; *barley*, *grain*, *heavy*, *screened*; *barley*, *grain*, *light weight*; *emmer*, *grain*; *wheat*, *grain*.

————— 1938. Digestible nutrients and metabolizable energy in certain silages, hays, and mixed rations. Jour. Agr. Res. 57, 477-512; 1924, Amer. Soc. Anim. Prod. Proc., 39-43. Steers: alfalfa hay; corn silage; *corn silage*; sunflower silage; *sunflower silage*; sweetclover silage; *linseed oil meal*, *old process*; *oats*, *mill or low grade*. Sheep: sweetclover hay; corn silage; sunflower silage; sweetclover silage; sweetclover oat straw mixed silage.

————— AND H. H. SIMPSON, 1914. The utilization of feed by range steers of different ages. N. Mex. Agr. Expt. Sta. Bul. 91, 1-128. Steers: alfalfa hay.

————— AND L. FOSTER, 1916. The utilization of feed by range steers of different ages. II. Alfalfa hay and milo maize meal. N. Mex. Agr. Expt. Sta. Bul. 103, 1-117. Steers: *alfalfa hay*; *sorghum grain*, *milo*.

CRAMPTON, E. W., J. A. CAMPBELL, AND E. H. LANGE, 1940. Pasture studies. XVII. The relative ability of steers and rabbits to digest pasture herbage. Sci. Agr. 20, 504-509. Steers: bluegrass, Kentucky, white clover redtop mixed hay.

————— AND F. WHITING, 1943. The digestibility of typical Eastern Canadian feeds by market bacon hogs. Sci. Agr. 23, 518-526, 725-731. Swine: *barley*, *grain*; *barley*, *grain*; *oats*, *grain*; *wheat screenings*.

- CRASEMANN, C., 1924. Untersuchungen ueber Futterkonservierung. Vergleichende Versuche ueber Gruenfutter-Suessgruenfutter- und Heu-Gewinnung. Landw. Vers. Sta. 102, 123-217. Sheep: grass legume mixed hay; grass legume mixed fodder, fed green; grass legume mixed silage.
- UND A. TSCHERNIAK, 1941. Der Futterwert von Birnentrestern fuer das Schwein. Ztschr. f. Tierernaehr. u. Futtermittelk. 6, 43-54. Swine: *pear pomace*.
- CROWTHER, C., AND H. E. WOODMAN, 1917a. The comparative digestibility of palm kernel cake, extracted palm kernel meal, and undecorticated cottonseed cake. Jour. Agr. Sci. 8, 429-447. Sheep: hay, British Isles; *cottonseed, whole, pressed; palm kernel oil meal*.
- 1917b. The digestibility of dried yeast. Jour. Agr. Sci. 8, 448-450. Sheep: *yeast, dried*.
- CUTTER, W. P., 1892. Digestibility of green and dry timothy. Utah Agr. Expt. Sta. Bul. 16, 1-12. Steers: timothy hay; timothy, fed green.
- DAVIES, W. L., AND R. S. SULLIVAN, 1927. The nutritive value of dried spent hops. Jour. Agr. Sci. 17, 380-387. Sheep: *hops, dried spent*.
- DAWSON, J. R., D. V. KOPLAND, AND R. R. GRAVES, 1940. Yield chemical composition and feeding value for milk production of alfalfa hay cut at three stages of maturity. U. S. Dept. Agr. Tech. Bul. 739, 1-51. Sheep: alfalfa hay.
- DIAKOW, M., F. PROKOFIEW, M. KNJAGINITCHEW, ET AL., 1929. Nutritive value of bran and of feed meal from Russian wheat of different types. Leningrad Selsk. Khoz. Inst. Zap. (Zootechnik Expt. Sta. Agr. Detskoje Selo, Leningrad Annals.) 1, 301-319. Sheep: hay, meadow, Europe; *wheat bran; wheat red dog*.
- DIETRICH, T., UND J. KOENIG, 1891. Zusammensetzung und Verdaulichkeit der Futtermittel. Berlin, Julius Springer, 1070-1127. Steers: hay, meadow, Europe.
- DIETRICH, W., AND H. S. GRINDLEY, 1914. Coefficients of digestibility of some common rations for swine. Ill. Agr. Expt. Sta. Bul. 170, 164-201. Swine: corn, grain; *pork cracklings, ground; tankage; wheat standard middlings; wheat red dog*.
- DINSMORE, S. C., 1908. Annual report of the Board of Control. Digestion experiments with native forage plants. Nev. Agr. Expt. Sta. Bul. 66, 37-48. Sheep: *peavine hay; vetch hay, hairy; alfalfa, fed green; willows, fed green*.
- 1909. Annual report of the Board of Control for year ending June 30, 1909. Nev. Agr. Expt. Sta. Bul. 72, 37-40. Sheep: alfalfa hay, 1st cutting; alfalfa silage, 2d cutting.
- AND P. B. KENNEDY, 1907. Digestion experiments with the native hay of the Truckee meadows. Nev. Agr. Expt. Sta. Bul. 64, 5-23. Sheep: clover grass mixed hay; grass mixed hay; hay, lowland, Nevada; rush, slenderbreak, sedge grass legume mixed hay.
- DOWELL, C. T., AND W. G. FRIEDEMANN, 1918. Experiments with bolly refuse: The economic uses to which bolly refuse may be placed and the composition of bolly cotton seed and their products. Okla. Agr. Expt. Sta. Bul. 121, 2-8. Steers: cotton bolly refuse, dry.
- 1923. The composition and digestibility of Sudan grass hay, darso, darso silage, broom corn seed, and sunflower silage. Okla. Agr. Expt. Sta. Bul. 132, 3-8. Sheep: sorghum: Sudangrass hay; sorghum silage, darso; sunflower silage; *sorghum grain, broomcorn; sorghum grain, darso*.
- 1921. A chemical study of broom corn and broom corn silage. Okla. Agr. Expt. Sta. Bul. 135, 3-7. Sheep: sorghum silage, broomcorn.

- DREW, J. P., D. DEASY, G. F. O'SULLIVAN, ET AL., 1938. The recovery of the nutrients of grass herbage as A. I. V. and as untreated silage and the comparative seasonal yield of nutrients from land cut for hay and for silage. Irish Free State Dept. Agr. Jour. 35, 171-200. **Steers:** hay, British Isles; hay, 2d cutting, British Isles; grass, mixed, fed green, British Isles; grass silage, British Isles; grass silage, A. I. V. **Sheep:** hay, British Isles; hay, 2d cutting, British Isles; grass, mixed, fed green, British Isles; grass silage, British Isles; grass silage, A. I. V.
- DUNBAR, B. A., 1925. Effect of feeding extremely wide rations to horses. S. Dak. Agr. Expt. Sta. Bul. 212, 3-30. **Horses:** oat straw.
- EDIN, H., 1917. Digestion experiments. II. Feeding hay to barnyard animals. K. Landtbr. Akad. Handl. och Tidskr. 56, 376-401. **Goats:** alfalfa hay.
- 1918. Cellulose as a source of feed. Centralanst. för Försöksv. på Jordbruksområdet Meddel. 168, 1-15. **Goats:** wood cellulose, treated with  $\text{Na}_2\text{S}$ , dry.
- AND G. SUNDERLIN, 1930. Experiments with marrow-stem kale, its cultivation and cultivative value. Centralanst. för Försöksv. på Jordbruksområdet Meddel. (Stockholm) 376, 1-44. **Steers:** kale, marrow, dried; kale, marrow, fed green.
- EHEART, J. F., AND A. D. PRATT, 1942. The digestibility and utilization by dairy cows of nutrients from fertilized and unfertilized bluegrass pasture. Va. Agr. Expt. Sta. Tech. Bul. 81, 1-28. **Cows:** bluegrass, Kentucky, pasture; bluegrass, Kentucky, fertilized, pasture.
- EHINGER, R., 1939. Untersuchungen ueber den Futterwert von kuenstlich getrocknetem Ruebenkraut und ueber die Futterwirkung bei Verfuetterung an Milchkuehe und an Arbeitspferde. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 11, 389-427. **Sheep:** hay, meadow, Europe; *beet tops*, sugar, dried. **Swine:** beet tops, sugar, dried; *beet tops*, sugar, dried.
- EHRENBERG, P., H. NIESCHLING, UND G. LIPINSKI, 1935. Die bitterstofffreie Gelblupine (Suesslupine) als Haferersatz bei der Fuetterung von Arbeitspferden. Teil I. Verwendung als Gruenfutter. Zuechtungskunde 10, 321-331. **Horses:** lupine, sweet yellow, oat mixed fodder, fed green.
- UND H. NIETSCH, 1936. Die Verfuetterung von Holzzuckerhefe als Eiweiss-traeager an Arbeitspferde und der Ersatz der Haferfuetterung durch Trockenschnitzel oder Kartoffelflocken mit Holzzuckerhefe. Landw. Vers. Sta. 125, 301-339. **Horses:** yeast, wood sugar.
- EISENKOLBE, P., 1910. Untersuchungen ueber die Verdaulichkeit des Samenruebenstrohes und der Zuckerruebensamenabfaelle. Landw. Vers. Sta. 72, 151-159. **Sheep:** beet seed hulls, sugar; beet straw, sugar.
- EMERY, F. E., 1899. Digestion experiments. N. C. Agr. Expt. Sta. Bul. 160, 187-204. **Sheep:** crabgrass hay; rape, fed green; cowpeas, seed; corn bran; rice bran.
- AND B. W. KILGORE, 1891. Digestion experiments. N. C. Agr. Expt. Sta. Bul. 80c, 3-14. **Cows:** cottonseed hulls.
- 1892. Digestion experiments. N. C. Agr. Expt. Sta. Bul. 87d, 1-53. **Cows:** cottonseed hulls; corn silage; cottonseed, whole; cottonseed, roasted; cottonseed meal. **Steers:** cottonseed, whole, roasted; cottonseed meal. **Sheep:** clover hay, crimson; cowpea hay; corn leaves, dry. **Goats:** clover hay, crimson; cowpea hay; corn leaves, dry; cottonseed hulls; soybean silage.
- 1894. Digestion experiments. N. C. Agr. Expt. Sta. Bul. 97, 87-132. **Cows:** clover hay, crimson; soybean hay; sorghum leaves, dry; cottonseed meal. **Steers:** cottonseed hulls. **Goats:** clover hay, crimson; Johnsongrass hay; peanut hay, without nuts or with few nuts; pearl millet hay; soybean hay; sorghum bagasse; sorghum leaves, dry; corn, grain; corn, grain; corn and cob meal; corn and cob meal; cottonseed meal.



EMERY AND KILGORE, continued

- 1895. Cottonseed hulls and meal for beef production. N. C. Agr. Expt. Sta. Bul. 118, 219-238. Steers: cottonseed hulls.
- 1898. Digestion experiments. N. C. Agr. Expt. Sta. Bul. 148, 275-299. Sheep: crabgrass hay; timothy hay; *timothy hay*.
- ESKEDAL, H. W., 1934. I. The digestibility of some feeds determined by trials with groups of milch cows. (Copenhagen) K. Vet. og Landbr. f. Landøkonomiske Forsøg. Beret. 155, 11-104, 162-178. Cows: clover hay, red; clover grass mixed hay; clover, red, grass mixed hay; clover, red, heavy grass mixed hay; ryegrass hay; timothy hay; barley oat pea vetch mixed fodder, fed green; clover, red, fed green; clover grass mixed fodder, fed green; clover, red, grass mixed fodder, fed green; clover, red, heavy grass mixed fodder, fed green; grass legume mixed fodder, fed green; clover, white, grass mixed fodder, fed green; mangels, roots; ryegrass, fed green; timothy, fed green; clover silage, red; clover silage, red, A. I. V.; clover grass mixed silage; clover grass mixed silage, A. I. V.; barley, grain; cottonseed, whole, pressed; cottonseed feed; cottonseed meal; oats, grain; soybean oil meal, hydraulic or expeller process; sunflower seed oil meal, hulls removed; sunflower seed oil meal, with hulls; wheat bran.
- EWING, P. V., AND F. H. SMITH, 1918. Digestibility of corn silage, velvet-bean meal, and alfalfa hay when fed singly and in combinations. Jour. Agr. Res. 13, 611-618. Steers: alfalfa hay; corn silage; velvetbeans, seed.
- AND C. A. WELLS, 1914. Digestion and metabolism of a steer when placed on a continuous ration of corn silage. Ga. Agr. Expt. Sta. Bul. 109, 145-158. Steers: corn silage.
- 1915. The associative digestibility of corn silage, cottonseed meal, and starch in steer rations. Ga. Agr. Expt. Sta. Bul. 115, 271-295. Steers: corn silage; cottonseed meal.
- AND F. H. SMITH, 1917. The associative digestibility of corn silage and cottonseed meal in steer rations. Part II. Ga. Agr. Expt. Sta. Bul. 125, 152-164. Steers: corn silage.
- FABRE, J., 1909. Sur la valeur alimentaire du marc de raisin. Montpellier, L'École Natl. d'Agr. Ann. N. S. 8, 219-228. Sheep: grape marc, fed fresh. Horses: grape marc, fed fresh.
- FINGERLING, G., 1905. Untersuchungen ueber den Einfluss von Reizstoffen auf die Futteraufnahme, Verdaulichkeit und Milchsekretion bei reizlosem und normalem Futter. Landw. Vers. Sta. 62, 11-179. Sheep: grass mixed hay, weathered; hay, meadow, Europe; spelt straw pulp; spelt straw; barley malt sprouts.
- 1906. Einfluss fettreicher und fettarmer Kraftfuttermittel auf die Milchsekretion bei verschiedenem Grundfutter. Landw. Vers. Sta. 64, 299-412. Sheep: hay, meadow, Europe; beet pulp, dried.
- 1908. Ersatz von Vollmilch durch Magermilch, mit und ohne Surrogate bei Saugkälbern. Landw. Vers. Sta. 68, 141-188. Calves: milk, cow's; milk, skimmed, fat added and emulsified; milk, skimmed, centrifugal.
- 1919a. Fuetterungsversuche mit aufgeschlossenem Stroh. Landw. Vers. Sta. 92, 1-56. Sheep: rye straw; rye straw, boiled or steamed; rye straw, treated with NaOH; rye straw, treated with Na<sub>2</sub>S, dried.
- 1919b. Fuetterungsversuche mit aufgeschlossenem Holz. Landw. Vers. Sta. 92, 147-170. Sheep: wood cellulose, treated with Na<sub>2</sub>S, dry; wood cellulose, treated with NaOH, dry.
- 1932. Der Naehrwert der Zuckerrueben. Landw. Vers. Sta. 113, 1-68. Steers: beets, sugar, roots, dried. Swine: beets, sugar, roots, dried; starch, potato.

## FINGERLING, continued

- 1933a. Der Naehrwert von Kartoffelflocken und Kartoffelschnitzeln. Landw. Vers. Sta. 114, 1-112. Steers: *potato flakes*. Swine: *potato flakes*.
- 1933b. Der Staerkewert des Gerstenschrotes. Landw. Vers. Sta. 116, 1-63. Steers: *barley, grain*. Swine: *barley, grain*.
- 1934. Der Staerkewert der Runkelrueben. Landw. Vers. Sta. 121, 1-141. Steers: *mangels, roots*. Swine: *mangels, roots*.
- 1937a. Der Staerkewert der Mohrrueben. Landw. Vers. Sta. 127, 157-223. Swine: *beets, sugar, roots, dried*.
- 1937b. Der Staerkewert den Zuckerrueben. Landw. Vers. Sta. 127, 235-356. Steers: *beets, sugar, roots; beets, sugar, roots, dried*. Swine: *beets, sugar, roots*.
- 1938. Der Staerkewert der Trockenschnitzel. Landw. Vers. Sta. 129, 177-307. Steers: *beet pulp, dried; beet pulp, soaked*. Swine: *beet pulp, dried; beet pulp, steamed*.
- E. BRETSCH, A. LOESCHE, UND G. ARNDT, 1914. Vergleichende Untersuchungen ueber die Verdauung der Rohfaser durch herbivore und omnivore Tiere. Landw. Vers. Sta. 83, 181-210. Sheep: *wheat chaff; grass, mixed, fed green, Europe*. Swine: *wheat chaff; grass, mixed, fed green, Europe*.
- P. EISENKOLBE, B. HIENTZSCH, ET AL., 1931. Der Staerkewert der Maissilage. Landw. Vers. Sta. 112, 243-260. Steers: *hay, meadow, Europe; corn silage*.
- 1938. Untersuchungen ueber den Stoff- und Energieumsatz wachsender Schweine. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 193-234. Swine: *peanut oil*.
- M. JUST, ET AL., 1937. Der Staerkewert der Mohrrueben. Landw. Vers. Sta. 127, 157-223. Steers: *carrots, roots*. Swine: *carrots, roots*.
- UND F. HONCAMP, 1934. Ueber den Wert der Holzzuckerhefe als Futtermittel. Landw. Vers. Sta. 118, 263-342. Sheep: *clover hay; soybean oil meal, solvent process; yeast, dried; yeast, wood sugar*. Swine: *barley, grain; soybean oil meal, solvent process; yeast, dried; yeast, wood sugar*.
- M. JUST, P. EISENKOLBE, ET AL., 1936. (c) Der Staerkewert des Holzzuckers. Landw. Vers. Sta. 126, 29-77. Steers: *sugar, feeding; sugar, wood*.
- A. KOEHLER, F. REINHARDT, ET AL., 1914. Untersuchungen ueber den Stoff- und Energieumsatz wachsender Schweine. Landw. Vers. Sta. 84, 149-230. Swine: *gluten; peanut oil; starch, potato; sugar, cane*.
- UND K. SCHMIDT, 1919. Die Strohaufschliessung nach dem Beckmannschen Verfahren. I. Einfluss der Aufschliessungszeit auf den Umfang der Naehrwertserschliessung. Landw. Vers. Sta. 94, 115-152. Steers: *rye straw, treated with NaOH*. Sheep: *rye straw; rye straw, treated with NaOH*.
- UND B. HIENTZSCH, 1933. Der Staerkewert von badischem Gruenmais. Landw. Vers. Sta. 117, 229-263. Steers: *corn fodder, fed green; corn silage*.
- 1934. Der Staerkewert der Holzzuckerhefe und getrockneten Bierhefe. Landw. Vers. Sta. 118, 287-342. Steers: *yeast, dried; yeast, wood sugar*. Swine: *yeast, dried; yeast, wood sugar*.
- UND A. SCHUSTER, 1923. Strohaufschliessung nach dem Beckmannschen Verfahren. II. Einfluss der Laugenmenge auf den Umfang der Naehrwertserschliessung. Landw. Vers. Sta. 100, 1-19. Sheep: *rye straw*.

- FISSMER, E., 1938. Untersuchungen ueber Zusammensetzung und Verdaulichkeit der Leinsaatkapselspreu. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 260-264. Sheep: hay, meadow, Europe; linseed capsule chaff.
- 1949. Beitrage zur Frage der Saettigung bei der Milchkuh. Ztschr. f. Tierernaehr. u. Futtermittelk. 5, 1-102. Sheep: clover hay; hay, meadow, Europe; oat straw; clover, crimson, ryegrass vetch mixed fodder, fed green; kale, marrow, fed green; lupine fodder, sweet, fed green; bean oat pea vetch mixed fodder, fed green.
- 1941. Ausnutzungsversuche mit Heu des ersten bzw. zweiten Schnittes und mit Samenheu von Wiesenschwingel, (*Festuca pratensis*) Knaulgras (*Dactylus glomerata*) und Wehrloser Trespe (*Bromus enermis*). Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 315-328. Sheep: brome hay, smooth; brome hay, smooth; fescue hay, meadow; orchardgrass hay; orchardgrass hay.
- FOLGER, A. H., 1934. The digestibility of brown alfalfa hay, sesame meal, and artichoke silage as determined for ruminants. Calif. Agr. Expt. Sta. Bul. 575. Sheep: alfalfa hay, brown; artichoke silage; sesame oil meal.
- 1937. The digestibility of perilla meal, he apseed meal, and babassu meal as determined for ruminants. Calif. Agr. Expt. Sta. Bul. 604. Sheep: hempseed oil meal; babassu oil meal; perilla oil meal.
- 1949. Digestibility of ground prunes, winery pomace, avocado meal, asparagus butts, and fenugreek meal. Calif. Agr. Expt. Sta. Bul. 635, 3-11. Sheep: asparagus butts meal; grape marc meal; grape marc meal; avocado oil meal; prunes, dried, ground.
- FORBES, E. B., F. M. BEEGLE, C. M. FRITZ, AND J. E. MENSCHING, 1914. A chemical study of the nutrition of swine. Ohio Agr. Expt. Sta. Bul. 271, 225-261. Swine: corn, grain; linseed oil meal, old process; milk, skimmed, centrifugal; soybeans, seed; tankage; wheat standard middlings.
- W. W. BRAMAN, M. KRISS, ET AL., 1927. Net energy values of corn silage, soybean hay, alfalfa hay and oats. Jour. Agr. Res. 34, 785-796. Steers: alfalfa hay; soybean hay; corn silage.
- ET AL., 1930. Further studies of the energy metabolism of cattle in relation to the plane of nutrition. Jour. Agr. Res. 40, 37-78. Steers: alfalfa hay.
- ET AL., 1931. The metabolizable energy and net energy values of corn meal when fed exclusively and in combination with alfalfa hay. Jour. Agr. Res. 43, 1015-1026. Steers: alfalfa hay; corn, grain; corn, grain.
- ET AL., 1933. The associative effects of feeds in relation to the utilization of feed energy. Jour. Agr. Res. 46, 753-770. Steers: timothy hay; oat straw; corn, grain.
- J. W. BRATZLER, AND C. E. FRENCH, 1949. The utilization of certain feeding stuffs by cattle. Pa. Agr. Expt. Sta. Bul. 391, 1-14. Steers: corn stover, dry; alfalfa silage, molasses added; alfalfa silage,  $H_2PO_4$  added; clover timothy mixed silage, molasses added; clover timothy mixed silage,  $H_2PO_4$  added; soybean silage, molasses added; soybean silage,  $H_2PO_4$  added; corn gluten feed; soybean oil meal, hydraulic or expeller process; soybean oil meal, solvent process.
- J. A. FRIES, AND W. W. BRAMAN, 1925. Net energy values of alfalfa hay and alfalfa meal. Jour. Agr. Res. 31, 987-995. Steers: alfalfa hay, excellent quality, extra green.

## FORBES, continued

— R. W. SWIFT, J. W. BRATZLER, ET AL., 1943. Conditions affecting the digestibility and the metabolizable energy of feeds for cattle. Pa. Agr. Expt. Sta. Bul. 452, 1-34. Steers: alfalfa hay; alfalfa hay; timothy hay; timothy hay; alfalfa silage, molasses added; alfalfa silage,  $H_2PO_4$  added; clover timothy mixed silage, molasses added; corn silage; soybean silage, molasses added; soybean sorghum mixed silage; corn, grain.

FRANCIS, C. K., AND R. O. BAIRD, 1910. A study of Bermuda grass. Part III. Okla. Agr. Expt. Sta. Bul. 90, 15-19. Sheep: Bermudagrass hay.

FRAPS, G. S., 1908. Digestion experiments. Part I. Kafir corn, milo maize, and molasses. Texas Agr. Expt. Sta. Bul. 104, 5-14. Steers: sorghum grain, kafir; sorghum grain, milo; molasses, cane.

— 1912. Digestion experiments with Texas hays and fodders. Texas Agr. Expt. Sta. Bul. 147, 5-28. Sheep: alfalfa hay, leafy; Bermudagrass hay; buffalograss hay; burclover hay, California; cowpea hay; gamagrass hay, Florida; Johnsongrass hay; millet hay; oat hay; Paragrass hay; peanut hay, with nuts; vetch hay, common; corn husks, dry; rice straw; sorghum fodder, kafir, dry; sorghum fodder, sorgho or sweet, dry.

— 1914. Digestion experiments with Texas feeding stuffs. Texas Agr. Expt. Sta. Bul. 166, 5-26. Sheep: alfalfa hay; Bermudagrass hay; tobosa hay; hay, prairie, Texas; cottonseed hulls; sorghum fodder, sorgho or sweet, dry; cowpea sorghum mixed silage; cottonseed, whole, pressed; cottonseed feed; cottonseed meal; corn bran; rice bran; rice polishings; sorghum grain, kafir; sorghum head chops, kafir.

— 1916. The productive value of some Texas feeding stuffs. Texas Agr. Expt. Sta. Bul. 203, 5-42. Sheep: alfalfa hay; bean hay, moth; Bermudagrass hay; hay, prairie, Texas; dolichos hay, hyacinth; peanut hay, without nuts or with few nuts; peanut hay, with nuts; Rhodesgrass hay; rice hay; sorghum; Sudangrass hay; peanut hulls with a few nuts; peat; sorghum fodder, dry; sorghum fodder, feterita, dry; sorghum fodder, kafir, dry; sorghum fodder, milo, dry; sorghum stover, milo, dry; sorghum fodder, shallu, dry; sorghum fodder, sorgho or sweet, dry; sorghum straw, Sudangrass; corn silage; sorghum silage, sorgho or sweet; corn, flint, grain, Argentine; cottonseed kernel meal, hulls removed; jackbeans, seed; peanut kernels, hulls removed; peanuts, with hulls; rice grain, rough; sorghum grain, feterita; sorghum head chops, milo; wheat white shorts.

— 1919. Feeding values of certain feeding stuffs. Texas Agr. Expt. Sta. Bul. 245, 2-29. Sheep: alfalfa hay; hay, prairie, Texas; peanut hay, without nuts or with few nuts; Rhodesgrass hay; soapweed hay, small; corn cobs, ground; cotton burs, dry; peanut hulls with a few nuts; rice hulls; soapweed stems, dry; tillandsia, treebeard (or Spanish moss), dry; acorns, live and post oak, whole; beet pulp, dried; cottonseed, whole, pressed; cottonseed meal; peanut oil meal; rice bran.

— 1922. Digestion experiments (Digestion coefficients of several feeds). Texas Agr. Expt. Sta. Bul. 291, 5-16. Sheep: alfalfa hay; sacahuista hay; soapweed hay, small; cottonseed hulls, delinted; oat by-product, clipped; oat mill feed; peanut hulls with a few nuts; beans, seed, pinto; corn bran; oats, grain; oats, rolled; sesame oil meal; sorghum grain, darso; sorghum grain, milo; sorghum grain, sorgho or sweet; velvetbean seeds and pods; wheat, grain; wheat bran; wheat brown shorts; wheat gray shorts; wheat white shorts.

— 1924. Digestion experiments with oat by-products and other feeds. Texas Agr. Expt. Sta. Bul. 315, 4-12. Sheep: alfalfa hay; corn cobs, ground; cottonseed hulls; leaves, live oak, dry; oat by-product, clipped; oat mill feed; sorghum head stems, kafir; cottonseed meal; mesquite bean, common; oats, mill or low grade; rice bran; rice polishings.

## FRAPS, continued

- 1929. Supplementary energy production coefficients of American feeding stuffs fed ruminants. Texas Agr. Expt. Sta. Bul. 402, 5-18. **Sheep:** alfalfa hay; alfalfa hay, leafy; alfalfa hay, stemmy; goosegrass hay; guar hay; hay, prairie, Texas; muhly hay, bush; cotton burs, dry; cottonseed hulls; cottonseed hulls; flax plant by-product, dry; peanut hulls with a few nuts; rice hulls; barley, grain; cottonseed meal; cottonseed meal; linseed oil meal, old process; rice bran; rice polishings; sorghum grain, broomcorn; sorghum grain, milo; wheat bran, wheat brown shorts; wheat gray shorts; wheat, grain.
- 1932. Digestibility and production coefficients of pig feed. Texas Agr. Expt. Sta. Bul. 454, 5-35. **Swine:** barley, grain; corn, grain; cottonseed meal; meat and bone scraps; rice bran; rice polishings; sorghum grain, milo; wheat bran; wheat gray shorts.
- FREAR, W., 1899. Digestibility of the corn crop and of the silage and fodder made from it. Digestion experiment. Pa. Agr. Expt. Sta. Ann. Rpt., 45-70. **Steers:** clover timothy mixed hay; corn fodder, dry; corn silage. **Sheep:** corn fodder, dry; corn silage.
- W. H. CALDWELL, G. L. HOLTER, AND W. S. SWEETSER, 1888. Digestibility of soiling crops. Pa. Agr. Expt. Sta. Ann. Rpt., 77-95. **Steers:** clover, fed green; corn fodder, fed green; rye fodder, fed green.
- FRENCH, M. H., 1931. Digestibility experiments. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 44-46. **Steers:** dogtoothgrass hay.
- 1932. Animal nutrition research. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 29-95. **Steers:** dogtoothgrass hay; dogtoothgrass hay, 2d cutting; acacia pods, dry; corn silage; peanut oil meal. **Sheep:** dogtoothgrass hay; hay, East Africa; acacia pods, dry; leaves, asbestosbush, dry; cassava roots; peanut tops, fed green; corn silage; grass silage, East Africa; beans, seed, kidney; cowpeas, seed; corn bran; millet bran, white.
- 1933a. Nutritive value of oil cakes and cottonseed. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 49-54. **Sheep:** coconut oil meal; cottonseed, whole; peanut oil meal; sesame oil meal.
- 1933b. The value of Guinea grass as silage. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 54-57. **Sheep:** Guineagrass silage; coconut oil meal.
- 1934. The value of the pods of *Acacia arabica* and *Dichrostachys glomerata* and the nutritive value of ground nut cake made by primitive methods, and "Maize silage." Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 79-90. **Steers:** corn silage. **Sheep:** acacia pods, dry; marabu pods, dry; peanut oil meal.
- 1935a. The nutritive value of some East African pig feeds. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 88-98. **Swine:** barley, grain; buckwheat, seed; corn, grain; peas, seed; pigeonpeas, seed; peanut oil meal; tankage; wheat bran; wheat, grain.
- 1935b. The nutritive value of some East African cereals. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 98-104. **Sheep:** hay, East Africa; buckwheat, seed; corn, grain; millet, grain; sweetclover seed, white.
- 1935c. The nutritive value of legume hays. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 104-110. **Steers:** cowpea hay. **Sheep:** velvetbean hay.
- 1937a. The nutritive value of cassava roots and the nutritive value of cowpea seed. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 81-85. **Sheep:** hay, East Africa; cassava roots; cowpeas, seed. **Swine:** cowpeas, seed.



## FRENCH, continued

- 1937b. Comparative nutritive values of legume hays. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 86-89. **Sheep:** cowpea hay; dolichos hay, hyacinth; velvetbean hay.
- 1937c. Comparative feeding values of grass when fed green as silage or as hay. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 90-94. **Sheep:** dogtoothgrass hay; dogtoothgrass grass mixed fodder, fed green; dogtoothgrass grass mixed silage.
- 1937d. The nutritive value of some East African pig foods. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 95-97. **Swine:** cottonseed, whole; milk, skimmed, centrifugal; pearl millet, grain; sweetclover seed, white.
- 1937e. The value of rice by-products for pig feeding. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 98-100. **Swine:** rice polishings.
- 1937f. The value of rice by-products for feeding to ruminants. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 101-105. **Sheep:** rice hulls; rice bran; rice polishings.
- 1938a. The value of banana trees in the nutrition of stock. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 28-36. **Sheep:** banana plants, fed green.
- 1938b. The composition, digestibility and nutritive values of the tops and tubers of the edible canna. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 37-40. **Sheep:** canna tops, fed green; canna tubers.
- 1938c. The effect of certain legumes on the feeding value of hay from a mixture of grass. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 41-42. **Sheep:** grass legume mixed hay.
- 1938d. The nutritive value of velvet bean. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 43-45. **Sheep:** velvetbeans, seed.
- 1938e. The composition, digestibility and feeding value of locally milled wheat bran. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 46-48. **Steers:** wheat bran. **Sheep:** wheat bran.
- 1938f. The nutritive value of kapok seed cake. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 49-50. **Steers:** kapok oil meal.
- 1938g. The composition and nutritive value of *Ficus sycomorus*. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 51-52. **Sheep:** leaves, sycomore fig, fed green.
- 1938h. Studies on the effects of foods and water shortages on cattle. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt. 2, 80-87. **Steers:** hay, East Africa.
- 1940. The comparative digestive power of Zebu and high grade European cattle. Jour. Agr. Sci. 30, 503-510. **Steers:** hay, East Africa; corn stover, dry; dogtoothgrass, giant, fed green; corn, grain; cottonseed, whole.
- 1941. The nutritive value of some Tanganyika grasses. Empire Jour. Expt. Agr. 9, 23-29. **Sheep:** bluestem, India, fed green; cutgrass, clubhead, fed green; dallisgrass, fed green; dogtoothgrass, giant, fed green; Guineagrass, fed green; fingergrass, pentz, fed green; napiergrass, fed green; Rhodesgrass, fed green; sandbur grass, fed green.



## FRENCH, continued

- AND H. E. HORNEY, 1934. Studies concerning the effect of the plane of nutrition on the course of animal trypanosomiasis. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 40-58. Steers: hay, East Africa; hay, 2d cutting, East Africa. Sheep: hay, East Africa; hay, 2d cutting, East Africa.
- 1935. Studies concerning the effect of the plane of nutrition on the course of animal trypanosomiasis. Tanganyika Dept. Vet. Sci. and Anim. Husb. Ann. Rpt., 49-73. Steers: hay, East Africa. Sheep: hay, East Africa.
- FRENZEL, F., 1937. Stoffwechselversuche bei Saugfohlen. II. Teil. Milchverwertung bei Saugfohlen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 9, 316-339. Foals: milk, mare's.
- FRIEDLAENDER, K., 1908. Ueber die Verdaulichkeit verschiedener Sorten Rieselheu im Vergleich zu Wiesenheu gleicher Provenienz. Landw. Vers. Sta. 69, 245-258. Sheep: hay, meadow, Europe; hay, meadow, sewage-irrigated, Europe.
- FROELICH, G., UND F. HARING, 1927. Ausnutzungsversuche mit kuenstlich getrocknetem, zerkleinertem eiweissreichem Gruenfutter am Wiederkaeuer. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 9, 204-213. Sheep: alfalfa hay, dehydrated; clover, crimson, ryegrass vetch mixed hay, dehydrated.
- UND H. LOEWE, 1936. Der Futterwert des Samens der Ackermannschen Malve. Kuehn. Arch. 40, 193-217. Sheep: alfalfa hay; hay, meadow, Europe; mallow seed; mallow seed, roasted; mallow seed oil meal, solvent process.
- GABRIEL, S., 1890. Ueber den Einfluss des Daempfers auf den Naehrwert der Lupinen. Erste Mitteilung. Jour. f. Landw. 38, 69-89. Sheep: hay, meadow, Europe; lupine seed; lupine seed, bitterness extracted.
- 1891. Ueber den Einfluss des Daempfers auf den Naehrwert der Lupinen. Zweite Mitteilung. Jour. f. Landw. 39, 65-85. Sheep: hay, meadow, Europe; lupine seed.
- UND G. GOTTWALD, 1887. Versuch ueber die Verdaulichkeit und den Futterwert der Wicken. Jour. f. Landw. 35, 239-247. Sheep: vetch grass mixed hay; hay, meadow, Europe; vetch hay, common.
- GAESSLER, W. G., AND A. C. McCANDLISH, 1918. Composition and digestibility of Sudan grass hay. Iowa Agr. Expt. Sta. Res. Bul. 46, 65-75; 1918, Jour. Agr. Res. 14, 176-185. Cows: sorghum: Sudangrass hay.
- GALLUP, W. D., AND A. H. KUHLMAN, 1936. The composition and digestibility of mungbean silage with observations on the silica ratio procedure for studying digestibility. Jour. Agr. Res. 52, 889-894. Cows: bean silage, mungo.
- GAMBLE, W. P., 1905. Digestion experiments. Ontario Agr. Col. Expt. Farm Ann. Rpt. 31, 100-103. Steers: corn fodder, dry; corn fodder, fed green; corn silage.
- 1906. Experiments in animal nutrition. Ontario Agr. Col. Expt. Farm Ann. Rpt. 32, 74-87. Steers: corn fodder, dry; oat hulls; oat straw; corn fodder, fed green; corn silage; barley dust; beet pulp, molasses added, dried; brewers' dried grains; corn bran; oats, grain; wheat bran. Sheep: clover hay; oat shorts; pea bran.
- AND G. E. DAY, 1908. Feeding experiments. Ontario Agr. Col. Expt. Farm Ann. Rpt. 34, 88-93. Steers: barley dust; corn, grain; oat shorts; wheat bran.
- GODDEN, W., 1920a. The digestibility of straw after treatment with soda. Jour. Agr. Res. 10, 437-456. Sheep: oat straw; oat straw, treated with NaOH; linseed oil meal, old process.

GODDEN, continued

- 1920b. Digestibility of peat moss after treatment with acid. *Jour. Agr. Sci.* 10, 457-459. **Sheep:** *oat straw, treated with NaOH; peat, treated with HCl.*
- GOETTINGEN LANDW. VERS. STA., 1900. Fuetterungsversuche mit landwirtschaftlichen Nutztieren. *Landw. Jahrb.* 29, Supp. II, 183-189. **Sheep:** *twigs, beech; beet crowns, sugar; mangels, roots; rice bran.*
- GOTTWALD, G., 1888. Versuch ueber die Verdaulichkeit der Rosskastanie. *Jour. f. Landw.* 36, 339-347. **Sheep:** *hay, meadow, Europe; horsechestnuts, shells removed.*
- GOY, S., 1913. Untersuchungen ueber die Verdaulichkeit der einzelnen Bestandteile von Sphagnum Torf, Torfmelasse und von Ablaugen der Sulfit-Zellulosefabrikation. *Landw. Vers. Sta.* 82, 1-92. **Sheep:** *sulfite waste liquors, dried; peat; peat, molasses added; peat, treated with NaOH, molasses added.*
- GRAMATZKI, F., 1933. Untersuchung ueber den Einfluss angesauerten Silofutters auf die Verdaulichkeit, die Stickstoff, Calcium und Phosphorbilanzen bei Rind, Schaf und Schwein. *Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol.* 28, 433-450. **Steers:** *clover hay; clover silage.* **Sheep:** *clover hay; clover silage.* **Swine:** *potato silage, steamed.*
- 1935. Die Wirkung von angesauertem Silofutter auf den Tierkoerper. *Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol.* 32, 299-330. **Sheep:** *clover grass mixed hay, 2d cutting; clover grass mixed fodder, fed green; clover grass mixed silage, HCl and H<sub>3</sub>PO<sub>4</sub> added; clover grass mixed silage, sugar added.* **Swine:** *potatoes, cooked; potato silage, steamed.*
- GRANDEAU, L., ET A. LECLERC, 1886. Études expérimentales sur l'alimentation du cheval de trait. III. Expériences d'alimentation au foin. *Ann. de la Sci. Agron. Franc. et Étrang. (Paris)*, 351-461. **Horses:** *hay, meadow, Europe.*
- 1888. Études expérimentales sur l'alimentation du cheval de trait. IV. Expériences d'alimentation avec l'avoine. *Ann. de la Sci. Agron. Franc. et Étrang. (Paris)*, 211-335. **Horses:** *oats, grain.*
- GREGOIRE, A., ET E. CORPIAUX, 1914. Sur la valeur alimentaire de quelques graminées. *Min. Rpts. et Commun. (Belgium) Min. de l'Agr.* 2, 5-48. **Sheep:** *fescue hay, meadow; oatgrass hay, tall; ryegrass hay, Italian; ryegrass hay, perennial.*
- GRETSCH, K., 1939. Die Eignung von kuenstlich getrockneten gruenen Suesslupinen fuer die Fuetterung an landwirtschaftliche Arbeitspferde in Verbindung mit kohlehydratreichen Futtermitteln. *Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung* 11, 435-464. **Horses:** *lupine hay, sweet, green, dehydrated.*
- GRINDLEY, H. S., W. J. CARMICHAEL, AND C. I. NEWLIN, 1917. Digestion experiments with pigs, with special reference to the influence of one feed upon another and to the individuality of pigs. III. *Agr. Expt. Sta. Bul.* 200, 55-94. **Swine:** *barley, grain; barley, grain; corn, grain; corn, grain; wheat flour middlings; wheat flour middlings.*
- GROH, G., AND I. D. GAETZ, 1916. The feeding value of peavine and common vetch hays. *Kiserlet Közlem.* 19, 387-390. **Sheep:** *peavine hay; vetch hay, common.*
- GUENTHER, A., A. HEINEMANN, J. B. LINDSEY, UND F. LEHMANN, 1893. Ueber die Verdaulichkeit von Reisigfuetterstoffen. *Jour. f. Landw.* 41, 65-83. **Sheep:** *hay, meadow, Europe; hay, meadow, 2d cutting, Europe; twigs, acacia, dry; twigs, beech, dry; twigs, poplar, dry; beans, seed.*
- GUENTHER, H., 1934. Fuetterungsversuch mit Kohlrueben als Haferersatz bei Arbeitspferden. *Landw. Jahrb.* 80, 723-768. **Horses:** *rutabagas, roots.*

- GUILBERT, H. R., AND S. W. MEAD, 1931. The digestibility of bur clover as affected by exposure to sunlight and rain. *Hilgardia* (Calif.) 6, 1-12. Sheep: burclover hay, California.
- AND H. GOSS, 1944. Digestion experiments with range forages. *Calif. Agr. Expt. Sta. Bul.* 684, 3-10. Sheep: brome, soft, fescue slender oat mixed hay; heronbill hay; flax hulls; *flax hulls*; deervetch, Spanishclover, fed green.
- HABERHAUFFE, W., 1927. Ueber den Einfluss der Zubereitung auf die Verdaulichkeit der Futtermittel. *Jour. f. Landw.* 74, 191-230. Swine: barley, grain; *barley, grain*; *barley feed*; corn, grain; *soybean oil meal, solvent process*; *wheat bran*.
- HACKEDORN, H., AND J. SOTOLA, 1920. Pea straw for fattening beef cattle. *Wash. Agr. Expt. Sta. Bul.* 157, 3-11. Steers: pea straw.
- HAGEMANN, O., 1909. Eiweiss-Stoffwechsel beim Hammel unter Verfueterung reiner Graeser. *Pflueger's Arch. Gesam. Physiol.* 128, 238-250. Sheep: trefoil hay, birdsfoot; fescue hay, meadow; foxtail hay, meadow; hay, meadow, Europe; ryegrass hay, perennial.
- 1911. Das Respirations-Calorimeter in Bonn und einige Untersuchungen mit demselben bei zwei Rindern und einem Pferde. *Landw. Jahrb.* 41, *Ergaenzungs.* I, 1-439. Steers: bentgrass clover timothy mixed hay; hay, meadow, Europe. Horses: bentgrass clover timothy mixed hay; hay, meadow, Europe; reed, common, reedgrass sedge mixed hay.
- HAMILTON, T. S., H. H. MITCHELL, AND W. G. KAMMLADE, 1928. The digestibility and metabolizable energy of soybean products for sheep. *Ill. Agr. Expt. Sta. Bul.* 303, 239-295. Sheep: alfalfa hay; soybean hay; oat straw; soybean straw; soybeans, seed; soybean oil meal, hydraulic or expeller process; *soybean oil meal, hydraulic or expeller process*.
- AND H. P. RUSK, 1927. A technical study of the digestibility of corn stover silage for beef cows. *Ill. Agr. Expt. Sta. Bul.* 291, 467-484. Cows: *corn stover silage*.
- HARCOURT, R., 1897. The report of the Department of Chemistry. *Ontario Agr. Col. and Expt. Farm* 23d Ann. Rpt., 31-38. Sheep: alfalfa, 2d cutting, fed green; clover, fed green; timothy, fed green.
- 1898. Composition of luzerne as affected by maturity. *Ontario Agr. Col. and Expt. Farm* 24th Ann. Rpt., 23-29. Sheep: alfalfa, 1st cutting, fed green; alfalfa, 2d cutting, fed green.
- HARE, R. F., 1908. Experiments on the digestibility of prickly pear by cattle. *U. S. Dept. Agr. Bur. Anim. Indus. Bul.* 106, 7-38. Steers: alfalfa hay, 2d cutting; *alfalfa hay, 2d cutting*; cactus, pricklypear, fed green; *cactus, pricklypear, fed green*.
- HARRINGTON, H., 1891. Digestibility of food stuffs. *Texas Agr. Expt. Sta. Bul.* 15, 86-88. Steers: corn tops, dried; cottonseed hulls.
- D. ADRIANCE, AND P. S. TILSON, 1890. Sorghum: Value as a feed stuff. Effect on soil. *Texas Agr. Expt. Sta. Bul.* 13, 29-38. Cows: sorghum fodder, sorgho or sweet, fed green.
- HARRISON, E., 1942. Digestibility trials on green fodders. Experiments conducted at the Imperial College of Tropical Agriculture. *Trop. Agr. (Trinidad)* 19, 147-150. Cows: bean fodder, mungo, fed green; bean, mungo, Guatemala gamagrass mixed fodder, fed green; bean, mungo, napiergrass mixed fodder, fed green; carpetgrass, tropical, fed green; gamagrass, Guatemala, velvetbean mixed fodder, fed green; gamagrass, Guatemala, 1st cutting, fed green; Guineagrass, fed green; napiergrass, fed green; napiergrass velvetbean mixed fodder, fed green; Paragrass, fed green; paspalum, fed green; sugarcane, fed green; sugarcane tops, fed green; sweetpotato vines, fed green; velvetbean vines, fed green.

- HART, G. H., H. R. GUILBERT, AND H. GOSS, 1932. Seasonal changes in the chemical composition of range forage and their relation to nutrition of animals. Calif. Agr. Expt. Sta. Bul. 543, 3-62. Sheep: brome, soft, grass mixed hay, weathered; heron-bill hay.
- HEADDEN, W. P., 1904. Colorado hays and fodder, alfalfa, timothy, native hay, corn fodder, sorghum, salt bush. Colo. Agr. Expt. Sta. Bul. 93, 3-40. Sheep: alfalfa hay, 1st cutting; hay, mixed, Colorado; timothy hay; wheatgrass hay, slender; corn fodder, dry; saltbush, silvery, dry; sorghum fodder, dry.
- 1929. The Australian saltbush; its composition and digestibility. Colo. Agr. Expt. Sta. Bul. 345, 4-27. Sheep: saltbush, Australian, dry.
- HEIDE, R. VON DER, T. KLEIN, UND N. ZUNTZ, 1913. Respirations- und Stoffwechselversuche am Rinde ueber den Naehrwert der Kartoffelschlempe und ihrer Ausgangsmaterialien. Landw. Jahrb. 44, 765-832. Steers: hay, meadow, Europe; *potato spent residue, dried.*
- HEIDPRIEM, F., 1873. Fuetterungsversuche mit Schafen. Landw. Vers. Sta. 16, 1-40. Sheep: lupine hay; lupine straw.
- HELLBERG, A., 1942a. Versuche mit Ensilierung von Markstammkohl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung, 14, 101-111. Sheep: *kale silage, marrow.*
- 1942b. Erntezeit, Einsaeuerungs- und Verdauungsversuche mit Kartoffelkraut. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 239-254. Sheep: *potato top silage.*
- HERBST, J., 1938. Fuetterungsversuche mit Gaerfutter von leichten Boeden als Kraftfutterersatz bei Schweinen und Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 402-442. Sheep: hay, meadow, Europe; *lupine silage, bitter blue; lupine silage, bitter white; lupine silage, bitter yellow; lupine silage, sweet yellow.* Swine: lupine silage, sweet yellow.
- HILDEBRANDT, H., 1926. Zur Kenntniss der Verluste des Rotklees an Roh- und an verdaulichen Naehrstoffen bei der Trocknung auf Pyramiden. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 7, 219-251. Sheep: clover hay, red, 1st cutting; clover hay, red, 1st cutting, dried on riders; clover hay, red, 2d cutting; clover hay, red, 3d cutting, dried on riders.
- HIRSCH, S., 1928. Zur Kenntniss der Wiesenertraege an verdaulichen Naehrstoffen und an Staerkewert bei zwei- und dreimaliger Mahd sowie bei verschiedener Duengung. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 11, 409-431. Sheep: hay, meadow, Europe; hay, meadow, fertilized, Europe.
- HODGSON, R. E., AND J. C. KNOTT, 1932a. Apparent digestibility of, and nitrogen, calcium, and phosphorus balance of dairy heifers on, artificially dried pasture herbage. Jour. Agr. Res. 45, 557-563. Cows: grass, mixed, immature, dehydrated.
- 1932b. The nutritive value of pasture grass. Western Div. Amer. Dairy Sci. Assoc. Proc. 18th Ann. Meeting, 42-45. Cows: clover, white, grass mixed, immature, dehydrated.
- 1936. The composition and apparent digestibility of the flat pea. (*Lathyrus sylvestris wagneri*). Jour. Dairy Sci. 19, 531-534. Sheep: peavine hay.
- 1937. Stack silage. Wash. Agr. Expt. Sta. Bul. 348, 5-34. Sheep: grass silage, Washington; oat pea mixed silage.
- 1938. The composition and apparent digestibility of pea silage, sun cured pea vines and artificially dried pea vines. Wash. Agr. Expt. Sta. 364, 1-12. Sheep: pea vines, from canneries, dehydrated; pea vines, from canneries, sun-cured; pea vine silage.

## HODGSON AND KNOTT, continued

- 1940. The feeding value of alfalfa hay compared with mixed hay and grass silage as a ration for dairy cattle. Wash. Agr. Expt. Sta. Bul. 386, 3-27. Sheep: alfalfa hay, U. S. grade No. 2 green, 2d cutting; clover grass mixed hay; clover grass mixed silage; oat pea mixed silage; pea vine silage.
- R. R. GRAVES, AND H. K. MURER, 1935. Effect of temperature of artificial drying on digestibility and availability of nutrients in pasture herbage. Jour. Agr. Res. 50, 149-164. Sheep: clover, white, grass mixed, immature, dehydrated and sun-cured; clover, white, grass mixed pasture.
- V. L. MILLER, AND H. K. MURER, 1938. The nutritive value of home grown roughage rations for dairy cattle. Wash. Agr. Expt. Sta. Bul. 366, 3-80. Sheep: clover grass mixed hay; clover grass mixed hay, 2d cutting; clover grass mixed silage; oat pea mixed silage.
- AND F. B. WOLBERG, 1942. Measuring the yield of nutrients of experimental pastures. Wash. Agr. Expt. Sta. Bul. 411, 5-31. Sheep: clover grass mixed pasture.
- ET AL., 1942. The value of liquid manure as a fertilizer for pasture. Wash. Agr. Expt. Sta. Bul. 412, 3-28. Sheep: clover grass mixed pasture; clover grass mixed pasture, fertilized with liquid manure.
- HOFMEISTER, V., 1864. Fuetterungs Versuche mit Schafen. Landw. Vers. Sta. 6, 185-202. Sheep: hay, meadow, Europe.
- 1873. Ueber den Einfluss des dem Raufutter beigefutternen Fettes in Substanz auf die Verdaulichkeit des Naehrstoffes desselben. Landw. Vers. Sta. 16, 347-383. Sheep: clover grass mixed hay.
- HOLDAWAY, C. W., W. B. ELLETT, AND J. F. EHEART, 1929. Methods of balancing rations for dairy cows in digestibility trials with corn meal. Va. Agr. Expt. Sta. Tech. Bul. 38, 3-10. Cows: hay, mixed, Eastern United States; corn, grain.
- AND M. P. MILLER, 1927. The importance of a properly balanced ration in trials to determine digestibility as shown in experiments with dried apple pomace. Va. Agr. Expt. Sta. Tech. Bul. 32, 3-18. Cows: apple pomace, dried.
- HOLTER, G. L., AND J. FIELDS, 1899. Digestion experiments and fodder analyses. Okla. Agr. Expt. Sta. Bul. 37, 1-20. Steers: sorghum fodder, kafir, dry; sorghum stover, kafir, dry; sorghum grain, kafir; sorghum head chops, kafir.
- HOLY, K., 1911. Ueber den Futter- und sonstigen landwirtschaftlichen Wert des Fromentals (franzoesischen Raygrasses, *Arrhenatherum elatius* Mertens und Koch) und des Knaulgrasses (*Dactylis glomerata* L.) und ueber eine der Hauptursachen der schlechten und schaedlichen Naehrwirkung des sauren Heues. Halle Univ. Landw. Inst. Ber. 4, (18), 96-190. Sheep: oatgrass hay, tall; orchardgrass hay.
- HONCAMP, F., 1906. Naehrwert und Verdaulichkeit von Haferspelzen, Hirse- und Erbsenschalen. Landw. Vers. Sta. 64, 447-476. Sheep: hay, meadow, Europe; millet hulls; oat chaff; pea hulls or pods, dry.
- 1907. Zusammensetzung und Verdaulichkeit der Zuckerschnitzel und ihr Wert als Futtermittel. Landw. Vers. Sta. 65, 381-406. Sheep: beet pulp, dried.
- 1910. Die Sojabohne und ihre Abfallprodukte. Landw. Vers. Sta. 73, 241-284. Sheep: clover hay; soybean oil meal, hydraulic or expeller process; soybean oil meal, solvent process.



## HONCAMP, continued

- 1915. Vergleichende Untersuchungen ueber die Zusammensetzung und Verdaulichkeit von frischem Gras, natuerlich geworbenem und durch kuenstliche Trocknung gewonnenem Heu. Landw. Vers. Sta. 86, 215-276. Sheep: hay, meadow, Europe; hay, air dried, Europe; hay, dehydrated, Europe; grass mixed, fed green, Europe.
- 1919. Ueber Bucheckernkuchen und Obstkernkuchennmehl. Landw. Vers. Sta. 93, 97-106. Sheep: hay, meadow, Europe; *beechnut oil feed with hulls; fruit pit oil meal*.
- 1920. Ueber den Futterwert der Trockenhefe auf Grund von Ausnutzungs- und Maestungsversuchen ausgefuehrt mit Schafen und Schweinen. Landw. Vers. Sta. 96, 143-206. Sheep: clover hay; *yeast, dried*. Swine: *yeast, dried*.
- 1923a. Ueber die Verluste an Roh- und verdaulichen Naehrstoffen bei der Brennheubereitung. Landw. Vers. Sta. 100, 79-88. Sheep: *serradella hay*.
- 1923b. Ueber den Futterwert des Kartoffelkrautes. Landw. Vers. Sta. 100, 89-102. Sheep: hay, meadow, Europe; *potato tops, dry*.
- UND F. BAUMANN, 1921a. Untersuchungen ueber den Futterwert des nach verschiedenen Verfahren aufgeschlossenen Strohes. II. Aufschluss des Strohes durch Aetzkalk mit und ohne Druck. Landw. Vers. Sta. 98, 1-41. Sheep: hay, meadow, Europe; *rye straw, winter; rye straw, treated with Ca(OH)<sub>2</sub>*.
- 1921b. Untersuchungen ueber den Futterwert des nach verschiedenen Verfahren aufgeschlossenen Strohes. III. Mitteilung: Aufschluss des Strohes mit Soda. Landw. Vers. Sta. 98, 43-63. Sheep: hay, meadow, Europe; *rye straw; rye straw, treated with NaOH; rye straw, winter, treated with NaHCO<sub>3</sub>, dried*.
- UND E. BLANCK, 1917. Ueber die Zusammensetzung und Verdaulichkeit von Laubreith (*Arundo phragmitis*) und Hing oder Kattig (*Scirpus maritimus*). Landw. Vers. Sta. 90, 113-122. Sheep: hay, meadow, Europe; *bulrush hay, sea; giantreed fodder, dry*.
- 1918a. Ueber die Zusammensetzung und den Futterwert einiger Schalenabfaelle. Landw. Vers. Sta. 91, 93-104. Sheep: hay, meadow, Europe; *buckwheat hulls; medic seed, black, ground; oat hulls; rape seed pod meal; corn germ meal*.
- 1918b. Ueber die Zusammensetzung und Verdaulichkeit von Heidekraut und Renntierflechte. Landw. Vers. Sta. 91, 223-251. Sheep: hay, meadow, Europe; *heather, Scotch, dry; heath, crossleaf, dry; reindeer moss, dry*.
- 1918c. Ueber die Gewinnung, Zusammensetzung und den Futterwert des Laubheues. Landw. Vers. Sta. 91, 291-308. Sheep: *leaves, black cherry, dry; leaves, black poplar, dry; leaves, willow, dry*.
- 1919a. Untersuchungen ueber den Futterwert der Nebenprodukte und Abfaelle der Obst- und Traubenwein-Bereitung. Landw. Vers. Sta. 92, 275-290. Sheep: *grape marc meal; apple pomace, dried*.
- 1919b. Untersuchungen ueber den Futterwert des nach verschiedenen Verfahren aufgeschlossenen Strohes. I. Mitteilung. Landw. Vers. Sta. 93, 175-194. Sheep: hay, meadow, Europe; *rye straw, winter; rye straw, treated with HCl, dried*.
- C. EICHLER, W. HELMS, UND E. REINMUTH, 1929. Herkunft, Zusammensetzung und Verdaulichkeit der Saflorkuchen und ihr Futterwert fuer Milchvieh. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 1, 3-29. Sheep: clover hay; *safflower oil meal*.

## HONCAMP, EICHLER, continued

- M. SACHSSE, UND H. C. SCHULZ, 1932. III. Untersuchungen ueber die Verdaulichkeit von Blutmehl, Fleischmehl, und Fleischmehlabbfaellen, Tierkoerpermehl sowie Walmehl und Waltierabbfaellen. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 25, 415-441. **Sheep:** *whale meat and bone meal. Swine:* *barley, grain; blood meal; bone meal; meat and bone scraps; tankage; whale meat and bone meal; whale bone meal.*
- H. GOETTSCH, B. GSCHWENDNER, ET AL., 1912. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit einiger landwirtschaftlicher Produkte aus Deutschlands afrikanischen Kolonien. Landw. Vers. Sta. 77, 305-350. **Sheep:** *clover hay; banana meal; banana peel meal; goober, Congo; sorghum, grain.*
- UND B. GSCHWENDNER, 1910. Weitere Untersuchungen ueber die Verdaulichkeit getrockneter Kartoffeln. Jour. f. Landw. 58, 363-380. **Sheep:** *potato flakes; potato pulp, raw, pressed, dried.*
- 1911. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit einiger Futtermittel. Landw. Jahrb. 40, 731-736, 767-799, 893. **Sheep:** *clover hay; clover grass mixed hay; hay, meadow, Europe; conifer needle meal, fir; conifer needle meal, fir, extracted; cottonseed hulls with some meal; pea hulls or pods, dry; carob seed; cottonseed, whole, pressed; corn bran; corn distillers' dried grains; corn gluten feed; corn oil meal; nigerseed oil cake; pumpkin seed meal; rye distillers' dried grains; sesame oil meal; sunflower seed oil meal, hulls removed.*
- UND D. ENGBERDING, 1910. Die Verdaulichkeit der getrockneten Kartoffelpuele. Jour. f. Landw. 58, 381-384. **Sheep:** *potato pulp, raw, pressed, dried.*
- 1911. Ueber den Wert einiger Futtermittel tierischen Ursprunges fuer den Pflanzenfresser. Landw. Vers. Sta. 75, 161-184. **Sheep:** *clover hay; blood meal; blood, soluble, dried; fish meal, herring; meat scraps, beef; whale meal.*
- UND H. MUELLNER, 1916. Untersuchungen ueber den Futterwert von getrocknetem, frischem und eingesaeuertem Ruebenkraut und ueber die Verluste an Roh- und verdaulichen Naehrstoffen beim Einsaeuern. Landw. Vers. Sta. 88, 305-378. **Sheep:** *clover hay; hay, meadow, Europe; beet roots and tops, sugar, dehydrated; beet crowns and tops, sugar, dehydrated; rutabaga crowns and tops, dehydrated; beet tops, sugar, fed green; beet crowns and tops, sugar, fed green; rutabaga crowns and tops, fed green; beet crown and top silage, sugar; rutabaga crown and top silage.*
- UND M. REICH, 1912. Untersuchungen ueber den Wert von gewoehnlichem und aufgeschlossenem Saagemehl fuer die tierische Ernaehrung. Landw. Vers. Sta. 78, 87-114. **Sheep:** *wood sawdust, dry; wood sawdust, treated with  $H_2SO_4$ , dry; wood sawdust, treated with  $H_2SO_4$ , molasses added, dry.*
- W. HELMS, P. H. MALKOMESIUS, ET AL., 1932. Ueber die Verwendung und Verwertung von Molkereirueckstaenden als Futtermittel in der landwirtschaftlichen Nutztviehhaltung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 4, 323-352. **Sheep:** *clover grass mixed hay; buttermilk, dried; milk, skimmed, dried. Swine:* *barley, grain; buttermilk, dried; milk, skimmed, dried.*
- ET AL., 1935. Neuere Untersuchungen ueber den Futterwert verschiedener Sojabohnenextraktionsschrote. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 31, 355-371. **Sheep:** *clover hay; soybean oil meal, solvent process. Swine:* *barley, grain; soybean oil meal, solvent process.*
- UND H. HILGERT, 1932. Strohaufschluss ohne Chemikalien. Landw. Vers. Sta. 113, 201-219. **Sheep:** *clover hay; rye straw; rye straw, boiled or steamed.*



## HONCAMP, HILGERT, continued

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- UND W. WOHLBIER, 1932. Ueber die Verdaulichkeit des Holzzuckers. Biochem. Ztschr. 248, 474-482. Sheep: clover grass mixed hay; sugar, wood. Swine: sugar, wood.
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- UND E. KOCH, 1920. Ueber den Einfluss der Groesse einer Futterration auf die Verdaulichkeit derselben. Landw. Vers. Sta. 96, 45-120. Sheep: clover hay.
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- E. MUELLER, UND W. SCHRAMM, 1925. Ueber die Beeinflussung der Rohfaserverdaulichkeit durch die Zusammensetzung der Futterration. Landw. Vers. Sta. 103, 179-208. Sheep: clover hay.
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- P. MALKOMESIUS, UND A. PETERMANN, 1929. Untersuchungen ueber Zusammensetzung, Verdaulichkeit und Futterwert von Leinkuchen und extrahiertem Leinsamenmehl. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 15, 277-288. Sheep: clover hay; linseed oil meal, old process; linseed oil meal, solvent process.
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- O. MEIER, K. NAUMANN, ET AL., 1934. Ueber die Verluste an Roh- und verdaulichen Naehrstoffen bei der Einsauerung von Zuckerruebenkraut in gewoehnlicher Weise und nach Zusatz verschiedener Konservierungsmittel wie Alfasil, Defuloesung und Penthesta. Zuechtungskunde 9, 214-221. Sheep: clover hay; beet tops, sugar, dried; beet top silage, sugar; beet top silage, sugar, PCl<sub>5</sub> added.
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- W. SCHRAMM, UND W. WOHLBIER, 1933. Weitere Untersuchungen ueber den Einfluss des Waschens von frischem und ungesauertem Zuckerruebenkraut auf Zusammensetzung und Verdaulichkeit desselben sowie ueber die hierbei entstehenden Verluste an Roh- und verdaulichen Naehrstoffen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 5, 65-86. Sheep: beet tops, sugar, dehydrated; beet tops, sugar, washed, chopped and dried; beet top silage, sugar.
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- UND K. MONTAG, 1921. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit einiger auslaendischer Futtererbsen. Landw. Vers. Sta. 99, 41-51. Sheep: hay, meadow, Europe; chickpeas, gram, seed; peas, seed; peavine seed, grass.
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- E. MUELLER, UND K. PFAFF, 1924. Ueber die Zusammensetzung und Verdaulichkeit von Babassu-Schrot und Sonnenblumenschrot (Sonnenblumenschalen). Landw. Vers. Sta. 102, 234-242. Sheep: hay, meadow, Europe; babassu oil meal; sunflower seed oil meal, with hulls.
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- F. POMMER, UND R. SOIKA, 1924. Ueber die Zusammensetzung und Verdaulichkeit von unentbitterten und entbitterten Lupinen und Lupinenabfaellen sowie ueber die Verluste an Roh- und verdaulichen Naehrstoffen bei verschiedenen Entbitterungsverfahren. Landw. Vers. Sta. 102, 261-307. Sheep: hay, meadow, Europe; lupine seed, bitter; lupine seed, bitterness extracted; lupine bran, bitterness extracted; lupine flakes, bitterness extracted; palm kernel oil meal, molasses added.
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- UND H. MUELLNER, 1914. Mitteilung der landwirtschaftlichen Versuchsstation Rostock. Vergleichende Untersuchungen ueber die Zusammensetzung und Verdaulichkeit von Hochmoor-, Niederungsmoor-, Marsch- und Kleeheu. (Germany) Reichs u. Preuss. Min. f. Ernaehr. u. Land. Ber. ueber Landw. Sonderheft. Heft. 32, 32-47. Sheep: clover hay; marsh hay; hay, upland, Europe.
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- UND B. STAU, 1914. Ueber den Einfluss einer laengeren Aufbewahrung und Lagerung von Wiesen- und Kleeheu auf deren Zusammensetzung und Verdaulichkeit. Landw. Vers. Sta. 84, 447-481. Sheep: clover, red, ryegrass mixed hay; hay, meadow, Europe.

## HONCAMP, continued

- P. NEUMANN, UND H. MUELLNER, 1913. Vergleichende Untersuchungen ueber die Verdaulichkeit von Roggen und Weizen und deren Mahlabfaellen durch Schaf und Schwein. Landw. Vers. Sta. 81, 205-288. Sheep: clover hay; rye, grain; rye feed flour, low-grade; rye feed; rye flour middlings; rye germ meal; wheat bran; wheat flour middlings; wheat germ oil meal; wheat standard middlings; wheat red dog; wheat, grain. Swine: barley, grain; rye, grain; rye feed flour, low-grade; rye feed; rye flour middlings; rye germ meal; wheat bran; wheat flour middlings; wheat germ oil meal; wheat standard middlings; wheat red dog; wheat, grain.
- UND O. NOLTE, 1919. Molinia Heu, seine Zusammensetzung und seine Futterwert. Landw. Vers. Sta. 93, 91-95. Sheep: moorgrass hay.
- 1920. Vergleichende Untersuchungen ueber die Zusammensetzung und Verdaulichkeit von Friedens und Kriegs-Weizen- und Roggenkleien. Landw. Vers. Sta. 96, 121-142. Sheep: rye bran; rye feed; rye middlings; wheat bran; wheat mixed feed.
- UND E. BLANCK, 1919. Weitere Untersuchungen ueber die Zusammensetzung und Verdaulichkeit einiger Kriegsfuttermittel. Landw. Vers. Sta. 94, 153-180. Sheep: hay, meadow, Europe; bean bran; beet seed hulls, sugar; corn cobs, ground; nettle meal; rumen contents, dried; tankage, absorbed on speltz chaff, dried; beet taproots, sugar, dried.
- UND E. POMMER, 1921. Untersuchungen ueber den Futterwert des nach verschiedenen Verfahren aufgeschlossenen Strohes. IV. Mitteilung: Aufschluss des Strohes mit Aetznatron unter Druck. Landw. Vers. Sta. 98, 249-363. Sheep: barley straw, winter; barley straw, winter, treated with NaOH, wet; oat straw; oat straw, treated with NaOH; pea straw; pea straw, treated with NaOH, wet; rape straw, treated with NaOH, wet; rape straw, treated with NaOH, dry; rye straw, winter; rye straw, winter, treated with NaOH, wet.
- UND A. PETERMANN, 1929. Die Rueckstaende der Babassunuesse, ihre Zusammensetzung, Verdaulichkeit sowie ihre spezifische Wirkung auf den Fettgehalt der Milch. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 15, 359-374. Sheep: clover hay; babassu oil meal.
- UND C. PFAFF, 1925. Weitere Untersuchungen ueber den Futterwert von Roggenkleien verschiedenen Ausmahlungsgrades und von Roggenkeimen. Landw. Vers. Sta. 103, 259-278. Sheep: clover hay; rye bran; rye feed; rye middlings; rye germ meal.
- UND K. PFAFF, 1924. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit von Reismehl, Reisspelzen und Reismehlen mit verschiedenen Reisspelzenzusatzten. Landw. Vers. Sta. 102, 243-260. Sheep: rice bran and hulls; babassu oil meal; rice bran; rice feed; soybean oil meal, hydraulic or expeller process.
- UND E. POMMER, 1921. Untersuchungen ueber den Futterwert des nach verschiedenen Verfahren aufgeschlossenen Strohes. V. Aufschluss des Strohes mit Aetznatron und Aetzkalk in der Kaelte. Landw. Vers. Sta. 99, 231-266. Sheep: oat straw, treated with  $\text{Ca(OH)}_2$ ; oat straw, treated with NaOH; pea straw; pea straw, treated with NaOH, wet.
- M. POPP, UND J. VOLHARD, 1906. Untersuchungen ueber Naehrwert und die Verdaulichkeit von schalenreichem Baumwollsaaemehl und getrockneten Heferueckstaenden. Landw. Vers. Sta. 63, 263-274. Sheep: hay, meadow, Europe; cottonseed, whole, pressed; yeast, dry.
- M. REICH, UND H. ZIMMERMANN, 1912. Ueber Perillakuchen und Mowramehl. Landw. Vers. Sta. 78, 321-347. Sheep: hay, meadow, Europe; perilla oil meal.

## HONCAMP, continued

- F. RIES, UND H. MUELLNER, 1914. Untersuchungen ueber die verschiedenen Stroharten mit besonderer Beruecksichtigung der Zusammensetzung der Rohfaser und der Zusammensetzung und Verdaulichkeit unter dem Einflusse der Witterung. Landw. Vers. Sta. 84, 301-398. *Sheep*: hay, meadow, Europe; *barley straw*; *barley straw*, winter; *lupine straw*; *oat straw*; *pea straw*; *rape straw*; *rye straw*; *rye straw*, winter; *spelt straw*; *wheat straw*; *wheat straw*, winter.
- M. SACHSSE, E. REINMUTH, UND H. C. SCHULZ, 1933. Chemische Zusammensetzung und Verdaulichkeit der Fischmehle. Landw. Vers. Sta. 115, 197-240. *Sheep*: clover hay; *fish meal*, cod, steam-dried; *fish meal*, Norwegian cod, air-dried; *fish meal*, herring, high fat; *fish meal*, herring, low salt; *fish meal*, herring, high salt; *fish meal*, pilchard; *fish meal*, stickleback; *fish meal*, white. *Swine*: barley, grain; *fish meal*, cod, steam-dried; *fish meal*, Norwegian cod, air-dried; *fish meal*, herring, low fat; *fish meal*, herring, high fat.
- UND W. SCHRAMM, 1926a. Ueber den Futterwert verschiedener Gerstesortierungen. Landw. Vers. Sta. 104, 285-296. *Sheep*: *barley, grain*; *barley, grain*, heavy, screened; *barley, grain*, light weight; *barley screenings*.
- 1926b. Verdaulichkeit von Gerste und deren Mahlabfaellen. Landw. Vers. Sta. 104, 297-312. *Sheep*: *barley, grain*; *barley bran*; *barley middlings*; *barley mixed feed and screenings*.
- 1931a. Neuere Untersuchungen ueber den Futterwert des Zuckerruebenkrautes. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 3, 174-207. *Sheep*: clover grass mixed hay; *beet tops*, sugar, dried; *beet tops*, sugar, dehydrated; *beet tops*, sugar, washed, chopped and dried; *beet top silage*, sugar.
- 1931b. Ueber die Zusammensetzung und Verdaulichkeit von Futterrueben. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 3, 208-219. *Sheep*: *mangels*, roots.
- UND H. STOTZ, 1928. Weitere Untersuchungen ueber die chemische Zusammensetzung und den Naehrwert von Gelbhafer und Weisshafer. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 11, 433-444. *Sheep*: *oats*, grain.
- UND H. WIESSMANN, 1927. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit von Mais und dessen Abfallprodukten bei der Verarbeitung zu technischen Zwecken. Ztschr. f. Zuecht. Reihe B, Tierzuecht u. Zuechtungsbiol. 8, 265-284. *Sheep*: hay, meadow, Europe; *corn*, grain; *corn gluten feed*; *corn gluten meal*; *corn oil meal*.
- 1928. Untersuchungen ueber die chemische Zusammensetzung und den Naehrwert von Gelbhafer und Weisshafer. Jour. f. Landw. 76, 113-127. *Sheep*: *oats*, grain; *oat screenings*.
- 1930. Einsaeuerungsversuche mit Ruebenschnitzeln und Ruebenkraut. Futterkonservierung 2, 173-251. *Sheep*: clover hay; clover grass mixed hay; *beet tops*, sugar, dried; *beet tops*, sugar, washed, chopped and dried; *beet pulp silage*; *beet top silage*, sugar; *beet pulp*, dried.
- B. STAU, UND H. MUELLNER, 1915. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit einiger der wichtigsten Wiesengraeser. Landw. Vers. Sta. 87, 315-350. *Sheep*: *bentgrass hay*, colonial; bentgrass grass mixed hay; bluegrass hay, Kentucky; bluegrass hay; clover hay; clover grass mixed hay; fescue hay, meadow; fescue hay, red; hay, meadow, Europe; orchardgrass hay; ryegrass hay, Italian; ryegrass hay, perennial; timothy hay; timothy grass weeds mixed hay.

## HONCAMP, continued

- H. ZIMMERMANN, UND E. BLANCK, 1917. Ueber die Zusammensetzung und Verdaulichkeit einiger Kriegsfuttermittel (Wollsaatmehl, Maniokmehl, Ackerseufkuchen, Spargelbeerenschrot und Zichorienschrot). Landw. Vers. Sta. 89, 409-454. Sheep: hay, meadow, Europe; *asparagus berries, dried; cassava seed oil meal; charlock seed oil meal; chicory roots, dried; kapok oil meal.*
- 1919. Ausnutzungsversuche mit Mohnkuchen und Walnusskuchen. Landw. Vers. Sta. 93, 77-90. Sheep: hay, meadow, Europe; *poppy seed oil meal; walnut meal, hulls removed; walnut meal, with hulls.*
- UND O. NOLTE, 1920. Leindotterkuchen und entfettete Senfrueckstaende, ihre Zusammensetzung und ihre Verdaulichkeit. Landw. Vers. Sta. 96, 339-351. Sheep: hay, meadow, Europe; *falseflax seed oil meal; mustard seed oil cake.*
- HOENIGSCHMID, R., UND W. LIEBSCHER, 1936. Der Einfluss von hartem Wasser auf den Stoffwechsel nach Versuchen am Wiederkaeuer. Landw. Vers. Sta. 124, 329-344. Sheep: sweetgrass hay.
- HOPKINS, C. G., 1896. Composition and digestibility of corn ensilage, cowpea ensilage, soja bean ensilage, and corn fodder. Ill. Agr. Expt. Sta. Bul. 43, 181-208. Steers: corn fodder, dry; corn silage; cowpea silage; soybean silage.
- 1909. Composition and digestibility of corn fodder and corn stover. Ill. Agr. Expt. Sta. Bul. 58, 361-370. Steers: corn fodder, dry; corn stover, dry.
- HORN, V., I. ESAT-KADASTER, AND S. KANSU, 1938. The chemical composition, digestibility and utilization of Turkish corn stover. Tuerkiye Genel Kim. Kurunu Dergisi (Z. Allgem. Tuerk. Chem. Ver.) 3, 70-99; 1939, Chem. Zentr. 1, 1885-1886. Sheep: corn stover, dry.
- HOETZEL, K., 1934. Futterzucker und Zuckerschnitzel als Haferersatz bei der Fuetterung an Arbeitspferde. Zentbl. f. die Zuckerindust. 84, 131-163. Horses: *beets, sugar, roots, dried; oats, grain; sugar, feeding.*
- UND A. MUELLER, 1933. Die Verdaulichkeit von Gerstenfuttermehl und Hafer, sowie der Haferersatz durch Gerstenfuttermehl bei der Fuetterung an Arbeitspferde. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 5, 398-447. Horses: *barley middlings; oats, grain.*
- HUFFMAN, C. F., AND C. W. DUNCAN, 1942. The nutritive value of alfalfa hay. I. Cystine as a supplement to an all alfalfa hay ration for milk production. Jour. Dairy Sci. 25, 507-515. Cows: alfalfa hay.
- HUGHES, J. S., AND H. W. CAVE, 1931. Coefficients of digestibility of the constituents of milk and the balance of calcium and phosphorus in calves on a milk diet. Jour. Nutr. 4, 163-169. Calves: *milk, partly skimmed.*
- HUMMEL, J. A., 1906. The calculated and determined nutrients of rations. 2. The digestibility and value of emmer. Minn. Agr. Expt. Sta. Bul. 99, 120-138. Sheep: alfalfa hay; *emmer, grain.*
- HUTCHINSON, W. L., 1895. Chemical work. Digestion experiments. Miss. Agr. Expt. Sta. 8th Ann. Rpt., 79-89. Steers: clover hay, red. Sheep: clover hay, red; crabgrass hay; Johnsongrass hay; vetch hay, hairy; vetch, common, fed green; vetch, hairy, fed green.
- IRISH, R. H., 1890. Examination of cattle foods. Ore. Agr. Expt. Sta. Bul. 6, 3-9. Sheep: corn silage.
- ISAACHSEN, H., J. HOIE, AND H. ENGELSCHION, 1922. Leaves, their composition, digestibility, and value in the production of milk. Norges. Landbr. Høiskoles Meld. 2, 161-188. Sheep: *leaves, ash, dry; leaves, aspen, dry; leaves, alder, dry.*

## ISAACHSEN, continued

- AND O. ULVESLI, 1926. Milk production value of feeds made from fish. IV. Herring meal. Norges Landbr. Høiskoles Meld. Beret. fra Foringsforsøkene 20, 369-404. *Sheep: fish meal, herring; fish meal, herring, low salt; fish meal, herring, high salt.*
- 1929a. Investigation into the chemistry, digestibility, and production value of silage from turnip tops, sunflowers, and oat-pea-sunflower-vetch mixture. Norges Landbr. Høiskoles Meld. 9, 575-628. *Sheep: oat pea sunflower vetch mixed fodder, fed green; sunflower fodder, fed green; oat pea sunflower vetch mixed silage; sunflower silage.*
- 1929b. The chemical composition and milk-production value of rootleaves—(Chiefly turnip leaves). Norges Landbr. Høiskoles Beret. fra Foringsforsøkene 24, 1-31. *Sheep: oat pea sunflower vetch mixed fodder, fed green; sunflower fodder, fed green; turnips, roots; turnip tops, fed green; turnip top silage.*
- AND M. HUSRY, 1935. I. Composition, digestibility and feeding value of hay cut at different stages of maturity. Norges Landbr. Høiskoles Meld. 15, Beret. fra Foringsforsøkene 41, 137-221. *Sheep: bluegrass clover timothy mixed hay; clover grass timothy weeds mixed hay; clover timothy mixed hay; clover timothy weeds mixed hay; timothy hay; timothy grass weeds mixed hay; timothy grass weeds mixed hay, 2d and 3d cutting.*
- IWATA, H., 1926. On the disintegration of rice straw. Kyushu Imperial Univ. Jour. Agr. Sci. 1, 217-240. *Sheep: milkvetch hay, Chinese; rice straw; rice straw, treated with  $\text{Ca}(\text{OH})_2$ , dry; rice straw, treated with  $\text{NaOH}$ , dry; rice straw, boiled in water.*
- JORDAN, W. H., 1886. Digestion Experiments: Digestibility of maize kernel (corn) in various forms. Maine Agr. Expt. Sta. Ann. Rpt., 59-64. *Swine: corn, grain; corn and cob meal.*
- 1887. Digestion experiments. Maine Agr. Expt. Sta. Ann. Rpt., 71-82. *Sheep: clover hay; timothy hay; oat straw; potatoes, tubers; potatoes, cooked.*
- 1890. Relative yield of digestible material in early-cut and late-cut timothy hay. Maine Agr. Expt. Sta. Ann. Rpt., 65-67. *Sheep: timothy hay.*
- 1891. Digestion experiments. Maine Agr. Expt. Sta. Ann. Rpt., 29-40. *Sheep: millet hay, foxtail; timothy hay; corn fodder, fed green; corn fodder, large, immature, fed green; corn fodder, sweet, fed green; beets, sugar, roots; mangels, roots; millet fodder, foxtail, fed green; rutabagas, roots; turnips, roots, English flat; corn gluten meal; wheat bran.*
- 1893. Digestion experiments. Maine Agr. Expt. Sta. Ann. Rpt., 25-56. *Sheep: barley hay; corn fodder, dry; corn fodder, large, immature, dry; corn fodder, sweet, partly dried; corn silage; corn silage, large, immature.*
- 1894. Digestion experiments. The influence of food combinations upon digestibility. Maine Agr. Expt. Sta. Ann. Rpt., 35-50. *Sheep: timothy grass weeds mixed hay; corn silage; corn silage, large, immature.*
- AND C. G. JENTER, 1897. Digestion and feeding experiments. N. Y. State Agr. Expt. Sta. Bul. 141, 691-720. *Sheep: corn stover, dry; corn stover, pith removed, chopped, dry.*
- JOSEPH, W. E., AND M. J. BLISH, 1920. Studies on the digestibility of sunflower silage. Mont. Agr. Expt. Sta. Bul. 134, 1-8. *Steers: clover hay; clover hay; sunflower silage; sunflower silage.*



- KASPRZIK, B., 1932. Einsaeuerungsversuche mit schachtelhalmhaltigem Gras und Lupinen nach dem Warm- und Kaltgaerverfahren unter besonderer Beruecksichtigung des Verhaltens der Lupinenalkaloide. *Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol.* 25, 111-145. *Sheep: clover hay; hay, meadow, 2d and 3d cutting, Europe; grass silage, Europe; lupine silage.*
- KATAYAMA, T., 1914. Ueber die Verwertung von Stengeln und Blaettern der Suesskartoffelpflanze (*Ipomoea batatas* lam.) als Futtermittel. (Japan) *Imp. Agr. Expt. Sta.* 2, 41-74. *Sheep: hay, Japan; sweetpotato vines, dried; sweetpotato vine silage.*
- KELLNER, O., 1877. Versuche ueber die Verwertung des norwegischen Fischguanos. *Landw. Vers. Sta.* 20, 423-438. *Sheep: alfalfa hay; fish meal; oats, grain.*
- 1879. Ueber die Verwertung des ausgebrauten Hopfens als Futtermittel. *Deut. Landw. Presse* 6, 332-333. *Sheep: hay, meadow, Europe; hops, dried, spent.*
- 1880. Versuche ueber die Entbitterung und Verdaulichkeit der Lupinenkoerner. *Landw. Jahrb.* 9, 977-998. *Sheep: hay, meadow, Europe; lupine seed, bitter; lupine seed, bitterness extracted.*
- 1881. Untersuchungen ueber die Verwendung der Lupinenkoerner als Futtermittel. *Landw. Jahrb.* 10, 849-892. *Horses: hay, meadow, Europe; lupine seed, bitterness extracted; oats, grain.*
- 1886. Fuetterungsversuche mit Schafen ueber die Verdaulichkeit verschiedener Futterstoffe. *Landw. Vers. Sta.* 32, 72-89. *Sheep: barnyardgrass hay; grass mixed hay, 2d cutting; satintail grass, Brazil, very immature, dried; soybean hay; rice bran; soybeans, seed.*
- 1888. Research on the composition and digestibility of Japanese feeding stuffs. *Imp. Col. of Agr. u. Dendrology Komaba (Tokyo) Bul.* 2, 1-42. *Sheep: silvergrass, Chinese, field horsetail mixed hay; silvergrass, Chinese, bush lespedeza mixed hay; hay, Japan; soybean hay; rice straw.*
- UND F. HONCAMP, 1907. Fuetterungsversuche mit Schafen: Ueber die Verdaulichkeit des Maizenafutters. *Landw. Vers. Sta.* 66, 253-255. *Sheep: hay, meadow, Europe; corn gluten feed.*
- M. JUST, P. EISENKOLBE, UND M. POPPE, 1908. Untersuchungen ueber die Verdaulichkeit getrockneter Kartoffeln. *Landw. Vers. Sta.* 68, 39-60. *Sheep: potato flakes, dried. Swine: fish meal; potato flakes, dried.*
- F. HONCAMP, ET AL., 1907. Ueber die Verdaulichkeit des Roggenfuttermehles. *Landw. Vers. Sta.* 65, 466-470. *Sheep: rye feed flour, low-grade.*
- UND A. KOEHLER, 1898. Untersuchungen ueber den Nahrungs- und Energiebedarf volljaehriger gemaesteter Oehsen. *Landw. Vers. Sta.* 50, 245-296. *Steers: hay, meadow, Europe; rye middlings.*
- F. BARNSTEIN, UND L. HARTSUNG, 1898. Fuetterungsversuche mit Schafen: Ueber die Verdaulichkeit mehrerer Arten getrockneter Schlempe. *Landw. Vers. Sta.* 50, 297-316. *Sheep: hay, meadow, Europe; distillers' dried grains; corn distillers' dried grains with solubles; rye distillers' dried grains.*
- ET AL., 1896. Untersuchungen ueber den Stoff- und Energieumsatz volljaehriger Oehsen bei Erhaltungsfutter. *Landw. Vers. Sta.* 47, 275-331. *Steers: hay, meadow, Europe; oat straw.*
- W. ZIELSTORFF, UND F. BARNSTEIN, 1896. Untersuchungen ueber die Verdaulichkeit des entgifteten Ricinusmehles. *Landw. Vers. Sta.* 47, 332-341. *Steers: castorbean oil meal with hulls, toxicity extracted; oat straw.*



KELLNER, KOEHLER, ZIELSTORFF, UND BARNSTEIN, continued

- 1906. Vergleichende Versuche ueber die Verdauung von Wiesenheu und Haferstroh durch Rind und Schaf. Landw. Vers. Sta. 63, 313-319. **Sheep:** hay, meadow, Europe; oat straw.
- UND L. LÉPOUTRE, 1907. Ueber die Verdaulichkeit eines fettreichen Reiskuttermehles. Landw. Vers. Sta. 65, 463-465. **Sheep:** rice feed.
- UND R. NEUMANN, 1910. Fuetterungsversuche mit Schweinen ueber die Verdaulichkeit getrockneter Kartoffeln und des entfetteten Sojabohnenmehls. Landw. Vers. Sta. 73, 235-240. **Swine:** potato pulp, raw, pressed, dried; soybean oil meal, solvent process.
- J. VOLHARD, UND F. HONCAMP, 1902. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit der getrockneten Kartoffeln. Deut. Landw. Presse 29, 691. **Sheep:** potato, flour.
- O. ZAHN, UND H. von GILLERN, 1901. Fuetterungsversuche mit Melasse und Torfmehl. Landw. Vers. Sta. 55, 379-388. **Sheep:** hay, meadow, Europe; peat; molasses, very high protein.
- KENNEDY, P. B., AND S. C. DINSMORE, 1909. Digestion experiments on the range. Nev. Agr. Expt. Sta. Bul. 71, 7-36. **Sheep:** bluegrass hay, Sandberg; brome hay, mountain; lupine hay, little, Nevada; balsamroot fodder, arrowleaf, dry; leptotaenia fodder, carrotleaf, dry; hawkbeard fodder, gray, dry; mountainbush, bitter; paintedcup fodder, scarlet, dry; peavine fodder, thickleaf, dry; wyethia fodder, woolly, dry; yampa fodder, dry.
- KIDDER, R. W., 1939. The digestibility and nutrient content of napier grass. Master of Science Thesis, Univ. Ill.; 1945, Jour. Agr. Res. 70, 89-93. **Steers:** napiergrass, fed green.
- KIENLE, A., 1939. Neues Verfahren zur Ermittlung des Weideertrages. Ztschr. f. Tierernaehr. u. Futtermittelk. 2, 239-275. **Steers:** hay, meadow, Europe; grass mixed, fed green, Europe.
- KING, W. A., 1943. Comparison of molasses-alfalfa-silage and phosphoric acid-silage as feeds for the milking cow. N. J. Agr. Expt. Sta. Bul. 704, 1-35. **Cows:** alfalfa silage, molasses added; alfalfa silage, molasses added; alfalfa silage,  $H_3PO_4$  added; alfalfa silage,  $H_3PO_4$  added.
- KIRSCH, W., 1929. Die Entgiftung eines ueberstaendigen Grases durch die Silofuttermittelbereitung (Milchsaeuregärung). Ueber seinen Vitamingehalt und den der Silage. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 14, 333-380. **Sheep:** grass mixed hay, weathered; grass mixed, 2d cutting, late fall after snow, fed green; grass silage, late fall after snow.
- 1935. Der Futterwert der Suesslupine. Georgine 112, 303, 304, 314, 315, 327; Kirsch, W., und B. Kasprzik, 1934, Mitt. f. die Landw. 49, 764-765; Kirsch, W., und B. Kasprzik, 1935. Mitt. f. die Landw. 50, 25-26. **Sheep:** lupine hay, sweet; lupine fodder, sweet, fed green; lupine seed, sweet green; lupine seed, sweet green. **Swine:** lupine fodder, sweet, fed green; lupine seed, sweet green; lupine seed, sweet green.
- 1936. Verdauungsversuche mit extrahiertem Rapsschrot am Hammel. Landw. Vers. Sta. 124, 244-246. **Sheep:** rape seed oil meal, high fiber.
- 1938. Ueber den Futterwert von Unkrauttimothee (*Phleum pratense* var *Modosum*) fuer den Wiederkaeuer. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 285-288. **Sheep:** timothy seed, wild.

## KIRSCH, continued

- UND F. GRAMATZKI, 1936. Der Einfluss von angesauertem Gaerfutter auf den Stoffwechsel von Schafen und Schweinen mit besonderer Beruecksichtigung der  $H_2SO_4$  als Ansauerungsmittel. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 36, 101-107. Sheep: clover grass mixed silage,  $H_2SO_4$  added; clover grass mixed silage, sugar added.
- UND H. JANTZON, 1930. Vergleichende Untersuchungen (1) Ueber die Ertraege an Roh- und verdaulichen Naehrstoffen bei Rueben, Mais und Sonnenblumen, (2) Ueber den Futterwert der Mais- und Sonnenblumen-silage und der Rueben fuer die Milchleistung mit Beruecksichtigung der Anbau-, Ernte- und Konservierungskosten. Die Futterkonservierung 2, 158-171. Sheep: mangels, roots; corn silage; sunflower silage.
- ——— 1931. Der Gehalt an Roh- und verdaulichen Naehrstoffen aus Silofutter: (a) aus Hanf- und Wickengemenge (b) aus Oelrettich- und Wicken-gemenge. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 3, 3-12. Sheep: oatgrass hay, tall; hemp vetch mixed silage; radish, oilseed, vetch mixed silage.
- ——— 1932a. Vergleichende Untersuchungen (1) Ueber die Ertraege an Roh- und verdaulichen Naehrstoffen bei Rueben, Mais und Sonnenblumen, (2) Ueber den Futterwert der Mais und Sonnenblumensilage und der Rueben fuer die Milchleistung. Die Futterkonservierung 3, 193-206. Sheep: mangels, roots; corn silage; sunflower silage.
- ——— 1932b. Der Gehalt an Roh- und verdaulichen Naehrstoffen von Silofutter aus einem Gemenge von Wehrloser Trespe und Zottelwicke und aus einem Serradella-Oelrettich-Gemenge. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 4, 265-269. Sheep: brome vetch mixed silage; radish, oilseed, serradella mixed silage.
- ——— 1933. Vergleichende Untersuchungen ueber die Ertraege an Roh- und verdaulichen Naehrstoffen bei Rueben, Mais und Sonnenblumen unter Beruecksichtigung verschiedener Maissorten und der Ruebenblaetter. Die Futterkonservierung 4, 34-41. Sheep: corn silage; mangelp top silage; sunflower silage.
- ——— 1934. Vergleichende Untersuchungen ueber die Ertraege an Roh- und verdaulichen Naehrstoffen bei Rueben, Mais, Sonnenblumen, Markstammkohl und Topinambur und den Futterwert fuer die Milchleistung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 6, 159-172. Sheep: mangels, roots; corn silage; sunflower top silage, Jerusalem-artichoke; kale silage, marrow; sunflower silage.
- ——— 1935a. Vergleichende Untersuchungen ueber die Ertraege an Roh- und verdaulichen Naehrstoffen bei Rueben, Mais, Sonnenblumen, und Markstammkohl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 205-210. Sheep: beets, sugar, roots; kale, marrow, fed green; beet top silage, sugar; corn silage; sunflower silage.
- ——— 1935b. Vergleichende Untersuchungen ueber den Futterwert von frischem, getrocknetem, eingesauertem, und erfroren eingesauertem Markstammkohl. Zuechtungskunde 10, 218-224. Sheep: kale, marrow, dried; kale, marrow, fed green; kale silage, marrow; kale silage, marrow,  $HCl$  and  $H_3PO_4$  added.
- ——— 1937. Untersuchungen ueber den Wert der Futterruebe bei der Schweinemast. Zuechtungskunde 12, 19-25. Swine: mangels, roots; potatoes, cooked.

## KIRSCH UND JANTZON, continued

- 1938a. Vergleichende Untersuchungen ueber den Futterwert von Gaerfutter und Koernern gelber und blauer Suesslupinen (bitterstofffreie Lupinen der SEG) nach Versuchen am Wiederkaeuer und Schwein. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 265-284. **Sheep:** lupine silage, sweet blue; lupine silage, sweet yellow; *lupine seed, sweet blue; lupine seed, sweet yellow.* **Swine:** *lupine seed, sweet blue; lupine seed, sweet yellow.*
- 1938b. Der Futterwert von Maiskolbenschrot (Koerner und Spindeln) und Maisschrot (Koerner allein) fuer den Wiederkaeuer. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 289-292. **Sheep:** *corn, grain; corn and cob meal.*
- 1938c. Untersuchungen ueber den Naehrstoffgehalt von Baumwollsaatschrot. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 241-244. **Sheep:** *cotton-seed feed.*
- 1938d. Untersuchungen ueber den Wert roher und gesaeuerter Hackfruechte fuer das Schwein. Landw. Jahrb. 85, 801-827. **Swine:** *beets, sugar, roots; potatoes, tubers; potatoes, cooked; rutabagas, roots; turnips, roots; beet silage, sugar, roots; potato silage; potato silage, steamed; potato, steamed, sugar beet mixed silage; potato, steamed, rutabaga mixed silage.*
- 1939a. Der Einfluss kuenstlicher Trocknung auf den Futterwert von eingesaeuerten Ruebenblaettern. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 120-124. **Sheep:** *beet top silage, sugar.*
- 1939b. Der Futterwert kuenstlich getrockneter Suesslupinen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 11, 273-275. **Sheep:** *lupine hay, sweet.*
- 1940a. Weitere Untersuchungen ueber den Futterwert von Maiskolben, Koernern, Spindeln und Stroh fuer den Wiederkaeuer (Hammel) und das Schwein. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 395-410. **Sheep:** *corn cobs ground; corn stover, dry; beet top silage, sugar; beet top corn stover mixed silage; corn stover silage; corn, grain; corn and cob meal; corn ear chops, immature, fed green.* **Swine:** *corn, grain; corn and cob meal; corn ear chops, immature, fed green.*
- 1940b. Vergleichende Untersuchungen ueber den Naehrstoffgehalt verschiedener Massentrueben und gehaltvoller Futterrueben sowie frischer und eingesaeuerter Blaetter von Massentrueben, gehaltvollen Futterrueben, Zuckerrueben, und Kohlrueben. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 501-519. **Sheep:** *beet crowns and tops, sugar, fed green; mangels, roots; mangel crowns and tops, fed green; rutabaga crowns and tops, fed green; beet crown and top silage, sugar; mangel top silage, wilted; mangel top silage, wilted, washed; mangel crown and top silage; rutabaga crown and top silage.*
- 1940c. Einsaeuerungsgemische von Kartoffeln und Leguminosen (Stoppelklee und Ackerbohnen) und ihr Futterwert fuer das Schwein. Ztschr. f. Tierernaehr. u. Futtermittelk. 4, 284-291. **Swine:** *bean silage; bean steamed potato mixed silage; clover, red, potato mixed silage; potato silage, steamed.*
- 1941. Ueber Rachitis-Entstehung und Verhuetung bei der Verfuetterung von Walfleischmehl an Schweine. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 180-188. **Swine:** *barley, grain; bone and fish meal mixed; fish meal; whale meal.*

## KIRSCH UND JANTZON, continued

- 1942a. Vergleichende Feststellungen ueber die Leistung verschiedener Werbungsverfahren (Darre, Duenndrahtreuter, Dreibockreuter, Trocknung am Erdboden, Gaerfutterbereitung) fuer die Erhaltung der Naehrstoffe in einem Klee-grasgemisch. Erste Mitteilung. Raufutterernte bei vorzueglichen Witterungsbedingungen und kurzer Verweildauer der Reuter auf dem Felde. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 71-84. Sheep: clover hay; clover hay, dehydrated; clover hay, red, 1st cutting, dried on riders; clover grass mixed silage.
- 1942b. Naehrstoffgehalt von normal gelagertem und Pick-up-Pressheu. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 442-445. Sheep: hay, meadow, Europe.
- UND B. KASPRZIK, 1934. Der Wert der "Suesslupine" (bitterstofffreie Lupine der SEG) 1. Ertraege und Naehrstoffgehalt der "Suesslupine" als Gruen-futter, Heu und Gaerfutter. Mitt. f. die Landw. (Berlin) 49, 764-765, 786-787. Sheep: lupine silage, sweet.
- D. WENCK, UND H. JANTZON, 1936. Der Futterwert von Heu reingezuechteter Graeser (englisches Raygras, Wehrlose Trespe, Wiesenschwingel.) Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 8, 261-266. Sheep: brome hay; fescue hay, meadow; ryegrass hay, perennial.
- KLEINERT, R., 1941. Ein Beitrag zu Stoffwechselfragen und zum Mineralstoffhaushalt von Saugfohlen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, Heft 5, 499-544. Foals: milk, mare's.
- KNIBBE, K., 1933. Der Naehrwert der Nacktgerste im Vergleich zur bespelzten Gerste beim Schwein. Landw. Vers. Sta. 117, 131-216. Swine: barley, grain; barley, grain, hull-less or bald; barley, grain, winter.
- KNIERIEM, W. VON, 1898a. Versuche zur Wertschaetzung des Wiesenheues. Landw. Jahrb. 27, 521-565. Cows: clover hay; hay, meadow, Europe.
- 1898b. Untersuchungen betreffend den Wert verschiedener Kraftfuttermittel. Landw. Jahrb. 27, 566-630. Sheep: hay, meadow, Europe; coconut oil meal; hempseed oil meal; rape seed oil meal.
- 1900. Der Roggen als Kraftfuttermittel. Landw. Jahrb. 29, 483-523. Sheep: hay, meadow, Europe; oats, grain; rye, grain.
- KNIGHT, H. G., F. E. HEPNER, AND T. F. MCCONNEL, 1908. Digestion experiments. II. Native hay, oat straw, pea hay, sweet clover, and alfalfa. Wyo. Agr. Expt. Sta. Bul. 78, 3-44. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; pea hay; rush, slenderbreak, sedge grass legume mixed hay; sweetclover hay; wheatgrass hay; oat straw.
- AND G. E. MORTON, 1906. Digestion experiments with wethers. Alfalfa hay and native hay. Wyo. Agr. Expt. Sta. Bul. 69, 3-42; Knight, H. G., 1905, Wyo. Agr. Expt. Sta. Rpt., 52-60. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; rush, Baltic, grass mixed hay; wheatgrass hay, bluestem.
- KNOTT, J. C., R. E. HODGSON, AND E. V. ELLINGTON, 1932. The feeding value of dried apple pomace for dairy cows. Wash. Agr. Expt. Sta. Bul. 270, 3-18. Cows: apple pomace, dried.
- H. K. MURER, R. E. HODGSON, AND E. L. OVERHOLSER, 1938. The digestibility and feeding value of apple and apple-alfalfa silage. Wash. Agr. Expt. Sta. Bul. 362, 5-20. Sheep: alfalfa apple mixed silage.
- J. O. TRETSVEN, AND R. E. HODGSON, 1933. The feeding value of pea feed and other pea by-products for dairy cows. Wash. Agr. Expt. Sta. Bul. 287, 3-20. Cows: pea straw; pea feed.

- KOEHLER, A., F. HONCAMP, M. JUST, ET AL., 1903. Fuetterungsversuche ueber die Ausnutzung von Roggen- und Weizenkleien von verschiedenen Ausmahlungsgrade. Landw. Vers. Sta., 58, 415-532. Sheep: hay, meadow, Europe; *rye feed; rye middlings; wheat bran*.
- KOENIG, J., A. FUERSTENBERG, UND R. MURDFIELD, 1907. Die Zellmembran und ihre Bestandteile in chemischer und physiologischer Hinsicht. Landw. Vers. Sta. 65, 55-110. Sheep: clover hay, red; grass mixed hay; pea straw. Swine: *barley feed; buckwheat feed; pea bran*.
- KOTOVSKII, L., AND E. BOROVKOVA, 1938. The feeding value of conifer cones. Problemy Zhivotnovodstva 11, 122-125. Sheep: *conifer cone meal, steamed*.
- KOUDELA, S., UND B. SCHNEIBERG, 1930. Untersuchungen ueber die Verluste an Roh- und verdaulichen Naehrstoffen bei der Duerrheubereitung und Ensilierung von Wiesen gras in der Futterkammer "Moravia." Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 18, 433-446. Sheep: hay, meadow, Europe; *grass silage, Europe*.
- AND J. ZAVADA, 1930. The relative nutritive value of white and yellow oats. Českoslov. Akad. Zeměděl. Věst. 6, 637-641. (Czechoslovak Acad. Agr. Bul.) Sheep: *oats, grain*.
- KOUKL, J., AND B. CURIN, 1932. Determination of the digestibility and nutritive value of nigerseed oil cakes. Českoslov. Repub. Min. Zeměděl. Sborn. Výzkumn. Úst. Zeměděl. (Tschéchoslov. Repub. Inst. des Rech. Agron. Rec. de Trav.) 91, 1-29. Sheep: hay, meadow, Europe; *nigerseed oil cake*.
- AND F. JIRASEK, 1938. Digestibility and nutritive value of sunflower silage. Zeměděl. Arch. 29, 134-143. Sheep: hay, meadow, Europe; *sunflower silage*.
- KREUSLER, U., G. HAVENSTEIN, R. HORNERGER, UND A. PREHN, 1879. Ueber den Einfluss des Daempfers auf die Verdaulichkeit des Wiesenheues. Landw. Jahrb. 8, 933-959. Steers: hay, meadow, Europe.
- KRZYWANIEK, F. W., UND J. BRUEGGEMANN, 1941a. Stoffwechselversuche mit alleiniger Verfuetterung von Lecksuchtheu an kranke und gesunde Ochsen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 341-357. Steers: hay, meadow, Europe.
- — — 1941b. Stoffwechselversuche mit alleiniger Verfuetterung von Lecksuchtheu an kranke und gesunde Ochsen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 358-375. Steers: hay, meadow, Europe.
- KURINZKY, R. VON, 1934. Untersuchungen ueber die Konservierungsverluste bei der Silofutterbereitung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 6, 235-280. Sheep: hay, meadow, Europe; *alfalfa silage; clover silage, red; oat pea vetch mixed silage*.
- KUEHN, G., O. BOETTCHER, R. SCHODER, ET AL., 1894. Versuche ueber die Verdaulichkeit der Mohnkuchen. Landw. Vers. Sta. 44, 177-187. Steers: hay, meadow, Europe; *poppy seed oil meal*.
- A. DUVE, A. HAASE, UND H. BAESECKE, 1870. Versuche ueber die Verdaulichkeit des Rothklees in verschiedenen Entwicklungszustaenden. Saechs. Amtsbl. f. Landw. Vereine 7, 90-92. Steers: clover hay, red, 1st cutting, dried on riders.
- M. FLEISCHER, UND N. STRIEDLER, 1869. Versuche ueber die Ausnutzung des bluehenden Rothklees als Gruenfutter und als Heu. Landw. Vers. Sta. 11, 177-201. Steers: clover hay, red; clover, red, fed green.

KUEHN, continued

- B. GERDES, G. KOCH, UND E. RAAB, 1894. Versuche ueber die Verdaulichkeit des Reisfuttermehls. Landw. Vers. Sta. 44, 112-134. Steers: hay, meadow, Europe; *rice feed*.
- F. GERVER, E. KISIELINSKY, UND A. SCHMIDT, 1894. Versuche ueber die Verdaulichkeit von frischen Biertrebern und Fleischmehl. Landw. Vers. Sta. 44, 1-26. Steers: clover hay; hay, meadow, Europe; *brewers' grains, wet; tankage*.
- W. KELBE, UND M. SCHMOEGER, 1876. Versuche ueber die Verdaulichkeit der Weizenkleie und deren Veraenderungen durch gewisse Zubereitungsmethoden. Saechs. Landw. Ztschr. 24, 304-312; 1877, Saechs. Landw. Ztschr. 25, 6-9. Steers: hay, meadow, Europe; *wheat bran*.
- M. SCHMOEGER, ET AL., 1883. Versuche ueber die Verdaulichkeit der Weizenkleie und deren Veraenderung durch verschiedene Arten der Zubereitung und Verabreichung sowie ueber die Verdaulichkeit des Wiesenheus im trockenen und angefeuchteten Zustande. Landw. Vers. Sta. 29, 1-214. Steers: hay, meadow, Europe; *wheat bran*.
- A. THOMAS, UND R. STRUVE, 1894. Versuche ueber die Verdaulichkeit von Erduusskuchen und Fleischmehl. Landw. Vers. Sta. 44, 27-50. Steers: hay, meadow, Europe; *peanut oil meal; tankage*.
- A. HAASE, UND H. BAESECKE, 1871. Versuche ueber die Verdaulichkeit der Luzerne im frischen Zustande und als Heu. Amtshl. f. d. Landw. Vereine Koenigr. Saechs. 12, 134-138; 1871, Organ f. d. Landw. Vers. Sta. des Koenigr. Saechs. N. F. Steers: alfalfa hay, dried on riders; alfalfa, fed green.
- 1873. Versuche ueber die Ausnutzung der Luzerne in frischem Zustande und als Heu. Landw. Vers. Sta. 16, 81-125. Steers: alfalfa hay; alfalfa, fed green.
- A. KOEHLER, P. LOESCHE, UND B. HOETTE, 1894. Versuche ueber die Verdaulichkeit der bei der Darstellung aetherischen Anis-Oels durch Destillation gewonnenen und getrockneten Rueckstaende der Anis-Samen, des sog. extrahierten Anis. Landw. Vers. Sta. 44, 150-162. Steers: hay, meadow, Europe; *anise seed oil cake*.
- P. MIELCKE, UND F. PASCHE, 1894. Versuche ueber die Verdaulichkeit des Baumwollsaatmehls. Landw. Vers. Sta. 44, 135-149. Steers: hay, meadow, Europe; *cottonseed meal*.
- G. KOENIG, UND O. BOETTCHER, 1894. Versuche ueber die Verdaulichkeit der Roggenkleie und der getrockneten Biertreber. Landw. Vers. Sta. 44, 73-111. Steers: hay, meadow, Europe; *brewers' dried grains; rye feed*.
- A. SCHMIDT, UND B. E. DIETZELL, 1872. Versuche ueber die Veraenderungen, welche die Verdaulichkeit des Rauhfutters durch Zugabe leicht verdaulichen Beifutters erleidet, und ueber die Verdaulichkeit von Rapskuchen, Leinkuchen und (entoeltet) Palmkernmehl. Amtshl. f. d. Landw. Vereine Koenigr. Saechs. 20, 137-142. Steers: hay, meadow, Europe; hay, meadow, 2d cutting, Europe; *linseed oil meal, old process; palm kernel oil meal; rape seed oil meal*.
- R. SCHODER, W. ZIELSTORFF, UND A. MOYE, 1894. Versuche ueber die Verdaulichkeit des Kokonusskuchenmehls. Landw. Vers. Sta. 44, 163-177. Steers: hay, meadow, Europe; *coconut oil meal*.
- A. THOMAS, UND O. NEUBERT, 1894. Versuche ueber die Verdaulichkeit der bei der Darstellung aetherischen Kuemmel- und Fenchel-Oels durch Destillation gewonnenen und getrockneten Rueckstaende der Kuemmel- und Fenchelsamen, des sog. extrahierten Kuemmels und Fenchels. Landw. Vers. Sta. 44, 51-72. Steers: hay, meadow, Europe; *caraway seed oil meal; fennel seed oil meal*.



KUEHN, THOMAS, continued

- E. MARTIN, ET AL., 1894. Fuetterungs- und Respirations-Versuche mit volljaehrigen Ochsen, ueber die Fettbildung aus Kohlehydraten und die Beziehungen des Futters zur Ausscheidung von Kohlenwasserstoffen. Landw. Vers. Sta. 44, 257-573. Steers: hay, meadow, Europe.
- LADD, E. F., 1888. Report of the Chemist. Feeding experiments. N. Y. State Agr. Expt. Sta. 7th Ann. Rpt., 270-279. Cows: orchardgrass hay; corn, grain.
- 1889. Report of the Chemist. N. Y. State Agr. Expt. Sta. Rpt., 71-150. Cows: alfalfa hay; clover timothy mixed hay.
- 1890. Investigations upon maize. Amer. Chem. Soc. Jour. 12, 369-392. Cows: corn fodder, flint, dry; corn silage; corn silage, flint.
- LANDER, P. E., AND L. C. DHARMANI, 1924. Some digestibility trials on Indian feedstuffs. India Dept. Agr. Mem. Chem. Series 7, 77-100. Steers: wheat straw; leaves, rosewood, fed green; chickpea, gram, seed; corn, grain.
- 1927. Some digestibility trials on Indian feeding stuffs. II. India Dept. Agr. Mem. Chem. Series 9, 63-83. Steers: wheat straw; rape, bird, fed green; leaves silage, rosewood.
- 1928. Digestibility trials on Indian feeding stuffs. III. Some Punjab hays. I. India Dept. Agr. Mem. Chem. Series 9, 235-246. Cows: itchgrass goldplume raphis mixed hay; tanglehead hay.
- 1929a. Some digestibility trials on Indian feeding stuffs. IV. Some Punjab hays. II. India Dept. Agr. Mem. Chem. Series 10, 169-180. Cows: bristlegrass browntopmillet crabgrass knotstem pennisetum vinegrass mixed hay; bristlegrass, yellow, iwarancusagrass rooigrass sorghum mixed hay; kangaroo-grass tanglehead mixed hay.
- 1929b. Some digestibility trials on Indian feeding stuffs. V. India Dept. Agr. Mem. Chem. Series 10, 181-192. Cows: oat hay; cottonseed, whole.
- 1930. Some digestibility trials on Indian feeding stuffs. VI. Green fodders and silage. India Dept. Agr. Mem. Chem. Series 10, 193-208. Cows: oat hay; corn fodder, fed green; guar fodder, fed green; oat fodder, fed green; corn silage; oat silage.
- 1931. Some digestibility trials on Indian feeding stuffs. VII. Kangra rice straw. Indian Jour. Vet. Sci. and Anim. Husb. 1, 177-191. Cows: rice straw.
- 1932. Some digestibility trials on Indian feeding stuffs. VIII. (Some Punjab hays. III and wheat bhusa.) Indian Jour. Vet. Sci. and Anim. Husb. 2, 141-159. Cows: Bermudagrass knotgrass mixed hay; bluestem hay, pitted; grass mixed hay; sandbur hay, India; wheat straw.
- 1935. Digestibility trials on Indian feeding stuffs. IX. American cottonseeds. Indian Jour. Vet. Sci. and Anim. Husb. 5, 343-349. Cows: oat hay.
- 1936. Digestibility trials on Indian feeding stuffs. X. Green fodders, hays, and gram bhusa. Indian Jour. Vet. Sci. and Anim. Husb. 6, 117-127. Cows: Bermudagrass, immature, dry; chickpea straw, gram; wheat straw; clover, Egyptian, fed green; Guineagrass, fed green; pearl millet fodder, fed green; sorghum fodder, juar, fed green, India; sorghum fodder, Sudangrass, fed green; sunflower fodder, fed green; sweetclover, annual yellow, fed green. Steers: clover hay, Egyptian; napiergrass, fed green; sorghum fodder, juar, fed green, India; velvetbean vines, fed green.

## LANDER AND DEARMANI, continued

- 1937. Some digestibility trials on Indian feeding stuffs. XI. Cottonseed cake as a cattle feed. *Indian Jour. Vet. Sci. and Anim. Husbandry*, 7, 225-230. **Cows:** cottonseed, whole; cottonseed feed; rape seed oil meal.

LATHROP, A. W., AND G. BOHSTEDT, 1938. Oat mill feed. Its usefulness and value in livestock rations. *Wis. Agr. Expt. Sta. Res. Bul.* 135, 1-128. **Cows:** timothy hay; oat mill feed. **Sheep:** timothy hay; oat mill feed. **Swine:** oat mill feed. **Horses:** oat hulls; oat mill feed.

LEHMANN, F., 1895. Fuetterungsversuche (Goettingen). *Landw. Jahrb.* 24, Ergaenzb. 1, 112-121. **Sheep:** leaves, beech, dried; twigs, beech, dried; oat chaff; oat straw; wood sawdust, dry; wheat chaff; wheat straw.

— UND J. H. VOGEL, 1890. Ueber die Verdaulichkeit von Wiesenheu, Bohnenschrot, Gerstenschrot, Steckrueben und Reisfuttermehl. *Jour. f. Landw.* 38, 165-197. **Sheep:** hay, meadow, Europe; rutabagas, roots; barley, grain; beans, seed; rice feed.

LEMKE, K., 1926. Zur Kenntnis der Verdaulichkeitsverhaeltnisse von zwei bei verschiedenen Temperaturen fermentierten Silagen und ihrer Vitamine. *Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol.* 7, 253-257. **Sheep:** clover hay; clover silage.

LENKEIT, W., UND M. BECKER, 1938. Stoffwechselversuche an Schafen mit kuenstlich getrockneten Futtermitteln, insbesondere mit kuenstlich getrockneten Ruebenkraut. *Ztschr. f. Tierernaehr. u. Futtermittelk.* 1, 102-110. **Sheep:** clover hay, stubble, dehydrated; hay, meadow, Europe; vetch grass mixed hay, dehydrated; beet tops, sugar, dehydrated; beet crowns and tops, sugar, dehydrated.

— UND E. LAGNEAU, 1938. Stoffwechselversuche an Schweinen mit kuenstlich getrocknetem Ruebenkraut und mit Molkeneiweiss unter Beruecksichtigung des Einflusses auf den Saeurebasenhaushalt. *Ztschr. f. Tierernaehr. u. Futtermittelk.* 1, 250-259. **Swine:** beet tops, sugar, dehydrated; barley, grain; whey-protein.

— E. WOLDAN, UND E. LAGNEAU, 1940. Untersuchungen ueber Fischextrakt bzw. Fischbruehe. *Jour. f. Landw.* 87, 275-289. **Sheep:** hay, meadow, Europe; fish press water, condensed. **Swine:** fish press water, condensed.

— UND M. VON SCHLEINITZ, 1940. Stoffwechselversuche an Ziegen mit einigen Futtermitteln und deren Einfluss auf den Saeurebasenhaushalt. *Jour. f. Landw.* 87, 249-259. **Goats:** alfalfa hay; alfalfa hay, dehydrated; hay, meadow, Europe; beet tops, sugar, fed green; potato peelings; beets, sugar, roots, dried; soybean oil meal, solvent process; wheat bran.

— UND E. LAGNEAU, 1940. Untersuchungen ueber einige Mahlabfaelle (Haferschaelkleie, Haferschalen, Weizen- und Roggenkeime) an Schafen, Schweinen und Huehnern und deren Einfluss auf den Saeurebasenhaushalt. *Ztschr. f. Tierernaehr. u. Futtermittelk.* 4, 7-19. **Sheep:** hay, meadow, Europe; oat hulls; oat shorts; wheat bran and germ oil meal. **Swine:** oat shorts; wheat bran and germ oil meal.

LEPHNE, G., 1927. Zur Kenntnis der Naehrstoffverluste von Rotklee bei zweimaliger Mahd und Erdbodentrocknung. *Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol.* 8, 379-404. **Sheep:** clover hay; clover hay, dried on riders; clover hay, 2d cutting.

LIERSCHER, W., 1938. Fuetterungsversuche mit "Terno"-Schnitten. *Ztschr. f. Tierernaehr. u. Futtermittelk.* 1, 277-281. **Sheep:** hay, meadow, Europe; beet pulp, molasses added, dried.

## LIEBSCHER, continued

- 1941. Versuche ueber Stadelheubereitung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 451-464. Sheep: hay, meadow, Europe; hay, air dried, Europe; grass, mixed, immature fed green, Europe.
- 1942a. Versuche mit dem Ulrich-Grastrockner. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 255-277. Sheep: hay, meadow, Europe; hay, air-dried, Europe; hay, 1st cutting, dried on riders, Europe.
- 1942b. Die Verdaulichkeit der Rueckstaende der Kuerbisoeelbereitung und ihr Gehalt an Mineralstoffen. Ztschr. f. Tierernaehr. und Futtermittelk. 6, 97-106. Sheep: hay, meadow, Europe; pumpkin seed hulls; pumpkin seed oil meal, solvent process; pumpkin seed meal.
- LINDSEY, J. B., 1893. Digestion experiments with sheep. Mass. Agr. Expt. Sta. Rpt., 146-178. Sheep: clover grass mixed hay; corn cobs, ground; brewers' dried grains; corn gluten feed; linseed oil meal, old process; linseed oil meal, solvent process; wheat bran; wheat flour middlings.
- 1903. Digestibility of winter wheat and vetch. Mass. Agr. Expt. Sta. 15th Ann. Rpt., 63-68. Goats: vetch, hairy, winter wheat mixed hay; vetch, hairy, winter wheat mixed fodder, fed green.
- 1904. Digestion experiments with sheep. Mass. Agr. Expt. Sta. 16th Ann. Rpt., 63-80. Sheep: bluegrass hay, Kentucky; apple pomace, wet; brewers' dried grains; distillers' dried grains; mall sprouts; soybeans, seed.
- 1905. Experiments in animal nutrition: I. Digestion experiments with sheep. Mass. Agr. Expt. Sta. 17th Ann. Rpt., 45-93. Sheep: redtop timothy mixed hay; corn fodder, large immature, dry; soybean fodder, fed green; corn silage, large immature; apple pomace, wet; beet pulp, molasses added, dried; blood meal; clover seed, alsike; hominy feed; soybeans, seed.
- 1914. Coconut meal. Mass. Agr. Expt. Sta. Bul. 155, 182-190. Sheep: coconut oil meal.
- 1919. The nutrition of the horse. Mass. Agr. Expt. Sta. Bul. 188, 243-263. Horses: velvetbean seeds and pods.
- AND C. L. BEALS, 1918. Part I. The composition, digestibility, and feeding value of alfalfa. Mass. Agr. Expt. Sta. Bul. 186, 105-141. Cows: alfalfa hay, 3d cutting; grass mixed hay, 2d cutting.
- 1920. The nutritive value of cattle feeds. Mass. Agr. Expt. Sta. Bul. 200, 117-135. Sheep: oat hulls; oat mill feed. Horses: oat hulls; oat mill feed.
- AND J. G. ARCHIBALD, 1921. The nutritive value of cattle feeds: Dried apple pomace, for farm stock. Mass. Agr. Expt. Sta. Bul. 205, 135-148. Sheep: apple pomace, dried.
- 1926. The digestibility and energy values of feeds for horses. Jour. Agr. Res. 32, 569-604. Horses: alfalfa hay; alfalfa timothy mixed hay; timothy hay; corn cobs, ground; oat hulls; oat mill feed; barley, grain; brewers' dried grains; corn, grain; cottonseed feed; cottonseed meal; corn bran; linseed oil meal, old process; oats, grain; wheat bran.
- AND P. H. SMITH, 1917. Digestion experiments with sheep. Mass. Agr. Expt. Sta. Bul. 181, 241-335. Sheep: alfalfa hay, 3d cutting; bluegrass, Kentucky, sweet vernalgrass hay; clover grass mixed hay, 2d cutting; soybean hay; sorghum: Sudangrass hay (also immature dry); sorghum: Sudangrass hay; cabbage, whole, fed green; cabbage heads, outside leaves removed, fed green; cabbage leaves, fed green; carrots, roots; mangels, roots; pumpkins, entire; pumpkins, seeds removed; rutabagas, roots; sorghum fodder, Sudangrass, fed green; sweetclover, white, fed green; corn bran; corn distillers' dried grains; corn gluten feed; corn gluten meal; ivory nut meal; sorghum grain, feterita; yeast, dried grains.

LINDSEY, BEALS, SMITH, continued

— AND J. G. ARCHIBALD, 1923. Digestion experiments with cattle feeds. Mass. Agr. Expt. Sta. Bul. 216, 53-62. Sheep: bluegrass, Kentucky, clover sweet vernalgrass mixed hay; coffee residue, (*chicory and coffee grains*), dry; peanut hulls with a few nuts; carrots, roots; barley mixed feed and screenings; cottonseed meal; corn gluten feed; peanut oil meal; peanut skins; sorghum grain, felerita; velvetbean seeds and pods.

— E. B. HOLLAND, AND P. H. SMITH, 1907. The digestibility of cattle foods. Mass. Agr. Expt. Sta. 19th Ann. Rpt., 96-156. Sheep: bluegrass, Kentucky, red clover mixed hay; bluegrass, Kentucky, grass legume mixed hay; clover, red, heavy grass mixed hay; corn stover, dry; corn fodder, fed green; sorghum fodder, sorgho or sweet, fed green; soybean fodder, fed green; corn silage; corn stover silage; barley, grain, light weight; buckwheat middlings; cottonseed feed; corn gluten feed; hominy feed; malt sprouts; molasses; oat middlings; wheat, grain.

— AND B. K. JONES, 1898. The feeding value of salt-marsh hay. Mass. Agr. Expt. Sta. Bul. 50, 3-48. Sheep: bentgrass hay, colonial; bentgrass, colonial, salt-grass mixed hay; cordgrass hay; grass mixed hay; rush hay, saltmeadow; salt-grass hay, seashore.

— AND P. H. SMITH, 1910. I. The effect of Porto Rico molasses on the digestibility of hay and concentrates. Mass. Agr. Expt. Sta. 22d Ann. Rpt., 82-131. Sheep: bluegrass, Kentucky, clover sweet vernalgrass mixed hay; corn gluten feed; molasses, cane.

— 1912. The digestibility of cattle foods. Mass. Agr. Expt. Sta. 24th Ann. Rpt., 244-277. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; clover hay, red, 1st cutting; clover hay, red, 2d cutting; grass mixed hay; corn fodder, fed green.

— 1914. The digestibility of cattle foods. Mass. Agr. Expt. Sta. Bul. 152, 79-120. Sheep: bluegrass, Kentucky, grass mixed hay; clover redtop timothy mixed hay; cocoa shells; flax plant by-product, dry; Mellon's food by-product from barley, malt, wheat bran and flour; posium by-product from molasses, roasted wheat, and wheat bran; sphagnum moss, molasses added, dry; beet pulp, dried; beet pulp, molasses added, dried; coconut oil meal; cottonseed feed; fish meal, menhaden; fish residue meal; wheat screenings.

— AND E. B. HOLLAND, 1894. Digestion experiments with sheep. Mass. Agr. Expt. Sta. Rpt., 146-174. Sheep: clover grass mixed hay; oat vetch mixed hay; peanut hulls with a few nuts; corn distillers' dried grains; corn gluten feed; corn gluten feed, maltose process; corn gluten meal; linseed oil meal, solvent process; rye, grain; soybeans, seed; wheat bran.

LINTON, R. G., A. N. WILSON, AND S. J. WATSON, 1934. The nutritive value of legume husks. Jour. Agr. Sci. 24, 260-268. Sheep: bean bran; lentil husks, common, dry; pea bran.

LIVESAY, E. A., A. H. VANLANDINGHAM, AND B. H. SCHNEIDER, 1940. Corn silage studies. Amer. Soc. Anim. Prod. Proc. 33d Ann. Meeting, 126-130 and unpublished data. Steers: corn silage; corn stover silage; corn ear silage, ears and husks.

— 1943. (Unpublished data). W. Va. Agr. Expt. Sta. Steers: alfalfa clover timothy mixed silage; alfalfa clover timothy mixed silage, molasses added; oat silage; oat silage, molasses added.

LOUW, J. G., 1938. The influence of frequency of cutting on the yield, chemical composition, digestibility and nutritive value of some grass species. Onderstepoort Jour. Vet. Sci. and Anim. Indus. 11, 163-244. Sheep: Rhodesgrass Guineagrass grass mixed hay.

- LUND, A., 1928. Experiments on the digestibility of various kinds of hay. K. Vet. og Landbohøjskoles. Forsøgslaboratoriet, Beret. 126, 59-65. Cows: alfalfa hay; alfalfa grass mixed hay; hay, meadow, Europe; hay, meadow, 2d cutting, Europe.
- LUSKE, B., 1934. Futterwert von Stengel, Laub und Kraut der Topinamburpflanze. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 6, 227-234. Sheep: sunflower fodder, Jerusalem-artichoke, dry.
- 1940. Nutrient values of hay and its aftermath. Mezőgazdasági Kutatások 13, 89-97. Sheep: hay, meadow, Europe; hay, meadow, 2d cutting, Europe.
- MCCALL, R., 1940. The digestibility of mature range grasses and range mixtures fed alone and with supplements. Jour. Agr. Res. 60, 39-50. Sheep: fescue hay, Idaho; wheatgrass hay, bearded bluebunch.
- R. T. CLARK, AND A. R. PATTON, 1943. The apparent digestibility and nutritive value of several native and introduced grasses. Mont. Agr. Expt. Sta. Tech. Bul. 418, 1-29. Sheep: brome hay, cheatgrass; wheatgrass hay, crested.
- MCCANDLISH, A. C., 1920a. The digestibility of sorghum mill refuse. Jour. Dairy Sci. 3, 367-369. Cows: sorghum mill refuse.
- 1920b. The digestibility of corn cannery refuse. Jour. Dairy Sci. 3, 370-374. Cows: corn cannery refuse, fed green.
- MAINE AGR. EXPT. STA. 1888. Determination of composition and digestibility of different species of grasses and other forage plants. Maine Agr. Expt. Sta. Ann. Rpt., 86-101. Sheep: reedgrass hay, bluejoint; clover hay, alsike; clover hay, white; danthonia hay, poverty; orchardgrass hay; redtop hay; timothy hay; quackgrass hay; buttercup fodder, dry; oxeysedaisy fodder, dry.
- 1889a. Analyses of hays from various grasses. Maine Agr. Expt. Sta. Ann. Rpt., 38-45. Sheep: reedgrass hay, bluejoint; clover hay, alsike; danthonia hay, poverty; redtop hay; timothy hay; quackgrass hay; corn fodder, dry.
- 1889b. The composition and yield of fodder from three varieties of corn and the digestibility of the same, both as dried fodder and as ensilage. Maine Agr. Expt. Sta. Ann. Rpt., 46-57. Sheep: corn fodder, large, immature, dry; corn fodder, sweet, partly dried; corn silage; corn silage, large, immature; corn silage, sweet.
- MALKOMESIUS, P., UND W. SCHRAMM, 1930. Ueber Sojabohnenextrakt-rueckstaende verschiedener Gewinnungsweise. Landw. Vers. Sta. 110, 33-47. Sheep: clover grass mixed hay; soybean oil meal, solvent process.
- MANGOLD, E., H. BRUEGGEMANN, UND E. THEEL, 1933. Versuche ueber die Verdaulichkeit von Futterstoffen aus Holz beim Gefluengel und Wiederkaeuer. Landw. Jahrb. 78, 649-658. Sheep: wood sawdust, treated with NaOH, dry.
- UND A. COLUMBUS, 1937a. Versuche ueber den Futterwert von getrockneten Suesslupinenkoernern dritter Qualitaet. Landw. Vers. Sta. 128, 211-219. Sheep: hay, meadow, Europe; lupine seed, sweet blue; lupine seed, sweet yellow.
- 1937b. Verdaulichkeit und biologische Wertigkeit von Kartoffeleiweiss beim Schwein. Landw. Vers. Sta. 129, 12-27. Swine: barley, grain; potato-protein pulp flakes.
- 1938a. Die Verdaulichkeit von Suesslupinenschalen beim Wiederkaeuer. Forschungsdienst 5, 255-258. Sheep: hay, meadow, Europe; lupine pods, sweet, dried.
- 1938b. Verdaulichkeit und biologische Eiweisswertigkeit der Samen-koerner einer neuen gelben Suesslupine ("Weiko") beim schwein. Landw. Vers. Sta. 129, 110-123. Swine: barley, grain; lupine seed, sweet yellow.



## MANGOLD, COLUMBUS, continued

- UND A. PEHAM, 1941. Ueber die Verdaulichkeit und biologische Eiweisswertigkeit von frischer und konservierter Bierhefe nach Versuchen an Schweinen und Wiederkäuern. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 189-210. **Sheep:** hay, meadow, Europe; *molasses yeast mixture*. **Swine:** barley, grain; *molasses yeast mixture*; *sugar yeast mixture*; yeast, wet; yeast, dried. **Horses:** yeast, wet.
- UND W. LINTEL, 1935. Die Verdaulichkeit der Nahrstoffe im Suesslupinenschrot bei Schweinen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 84-94. **Swine:** *lupine seed, sweet blue*; *lupine seed, sweet yellow*.
- UND H. STOTZ, 1939. Aufnahme und Ausnutzung von Roggenschrot bei der Schweinemast. Wiss. Arch. f. Landw. Abt. B, Arch. f. Tierernaehr. u. Tierzucht. 4, 347-368. **Swine:** barley, grain; *rye, grain*.
- — — — 1935. Verdaulichkeit und Naehrwert der Suesslupinenkoerner beim Wiederkauer. Landw. Vers. Sta. 123, 147-158. **Sheep:** hay, meadow, Europe; *lupine seed, sweet blue*; *lupine seed, sweet yellow*.
- — — — 1937. Versuche ueber Bekoemmlichkeit neuer Harnstoff-Futtermittel. Landw. Vers. Sta. 128, 199-204. **Sheep:** hay, meadow, Europe; *linseed oil meal, 15% urea added*; *potato flakes, 15% urea added*.
- UND A. COLUMBUS, 1936. Die Verdaulichkeit der neuen mit mechanischer Vorentwaesserung hergestellten Kartoffelflocken. Deut. Landw. Presse 3, 1-4. **Swine:** *potatoes, cooked*; *potato flakes*.
- — — — 1940. Die Verdaulichkeit der Finkschen Eiweisschlempe bei Schweinen und Wiederkäuern und die biologische Eiweisswertigkeit der Kartoffelhefe. Forschungsdienst 10, 183-191. **Sheep:** hay, meadow, Europe; *potato and mineral yeast, dried*. **Swine:** barley, grain; *potato and mineral yeast, dried*.
- — — — K. NEHRING, UND W. SCHRAMM, 1940. Untersuchungen ueber Verdaulichkeit und Futterwert von entkeimtem Mais im Vergleich zu nicht entkeimtem Mais bei Schweinen. Forschungsdienst 10, 88-93. **Swine:** corn, grain; corn, grain, degermed.
- — — — J. SCHMIDT, ET AL., 1939. Untersuchungen ueber die Verwendbarkeit der von Blanckenburgschen Trockenschlempe bei der Schweinemast. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 147-155. **Swine:** barley, grain; *distillers' dried solubles*.
- MEAD, S. W., AND H. R. GUILBERT, 1926. The digestibility of certain fruit by-products as determined for ruminants. Calif. Agr. Expt. Sta. Bul. 409. **Sheep:** *raisin pulp, dried*; *orange pulp, dried*.
- — — — 1927. The digestibility of certain fruit by-products as determined for ruminants. Part II. Dried pineapple pulp, dried lemon pulp, and dried olive pulp. Calif. Agr. Expt. Sta. Bul. 439. **Sheep:** *olive pulp meal*; *lemon pulp, dried*; *pineapple pulp, dried*.
- MEIER, O., 1933. Ueber den Einfluss der Art der Heuwerbung und der kuenstlichen Trocknung auf Ertrag und Naehrwert der Futterpflanzen sowie die Verwendungsmoeglichkeiten kuenstlich getrockneten Gruenfutters. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 5, 162-190. **Sheep:** hay, meadow, Europe; hay, meadow, dehydrated, Europe; hay, 1st cutting, dried on riders, Europe; hay, meadow, 2d and 3d cutting, Europe; hay, meadow, 2d and 3d cutting, dehydrated, Europe; hay, meadow, 2d and 3d cutting, dried on riders, Europe.
- MEISSL, E., F. STROHMER, UND N. LORENZ. 1886. Untersuchungen ueber den Stoffwechsel des Schweines. Ztschr. f. Biol. N. F. 4, 63-160. **Swine:** barley, grain, cooked; rice, polished, cooked.



MERTINS, H., 1933. Untersuchungen ueber die Verdaulichkeit von Einzelfuttermitteln und Futtergemischen unter besonderer Beruecksichtigung ihrer Abhaengigkeit vom "Naehrstoffverhaeltnis." Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 26, 367-394. Sheep: clover hay; *clover hay*; clover silage; *clover silage*; corn silage; *corn silage*; potato silage; *potato silage*.

MILLER, H. K., 1902. Velvetbean. Fla. Agr. Expt. Sta. Bul. 60, 448-468. Steers: velvetbean hay; velvetbean vines, fed green.

MITCHELL, H. H., AND T. S. HAMILTON, 1933. True and apparent digestibility of oat hulls and alfalfa meal by swine with special reference to the ability of swine to digest cellulose and crude fiber. Jour. Agr. Res. 47, 425-435. Swine: *alfalfa meal*; *oat hulls*.

——— W. G. KAMMLADE, AND T. S. HAMILTON, 1926. A technical study of the maintenance and fattening of sheep and their utilization of alfalfa. Ill. Agr. Expt. Sta. Bul. 283, 220-252. Sheep: *alfalfa hay*.

——— 1928. Relative energy value of alfalfa, clover, and timothy hay for the maintenance of sheep. Ill. Agr. Expt. Sta. Bul. 317, 127-167. Sheep: *alfalfa hay*; *clover hay*; *timothy hay*.

MØLLGAARD, H., UND G. THORBECK, 1938. Ueber den Naehrwert des A. I. V.-Futters und dessen Beeinflussung durch die Neutralitaetsregulation der gefuetterten Tiere. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 105-112. Cows: *alfalfa hay*, *dehydrated*.

MORGEN, A., C. BEGER, UND G. FINGERLING, 1905. Untersuchungen ueber den Einfluss des als Zulage zu einem knapp bemessenen Grundfutter gegebenen Nahrungsfettes und der andern Naehrstoffe auf die Milchproduktion. Landw. Vers. Sta. 62, 251-304. Sheep: hay, meadow, Europe.

——— 1906. Weitere Untersuchungen ueber die Wirkung der einzelnen Naehrstoffe auf die Milchproduktion. Landw. Jahrb. 64, 93-242. Sheep: hay, meadow, Europe; *beet pulp*, *dried*.

——— UND E. OHLMER, 1916. Ausnutzungsversuche mit verschiedenen Futtermitteln; nebst Eroerterungen ueber die Bestimmung der Verdaulichkeit des Proteins. Landw. Vers. Sta. 88, 243-290. Sheep: hay, meadow, Europe; hay, meadow, Europe; *reindeermoss*, *dry*; *blood meal*; *bone meal*; *palm kernel oil meal*, *doumpalm*; *ivory nut residue meal*. Swine: hay, meadow, Europe; palm kernel oil meal, *doumpalm*; *ivory nut residue meal*.

——— H. WAGNER, ET AL., 1917. Ausnutzungsversuche mit Wollsaatmehl, Pansenmischfutter, Rosskastanienabfall, Knochenfuttermehl, Eiweissparfutter, Baderschem Fleischmehl, entgerbten Lederabfaellen und Hornmehl. Landw. Vers. Sta. 89, 269-311. Sheep: hay, meadow, Europe; *chestnut residue from starch extraction*, *with shells*; *rumen contents*, *dried*; *rumen contents*, *molasses added*, *dried*; *bone meal*; *bone horn dried "stick" mixed meal*; *horn meal*; *kapok oil meal*; *skin and dried "stick" meal*.

——— ET AL., 1919. Ausnutzungsversuche mit 14 Futtermitteln nebst Eroerterungen ueber die Ursache der sogenannten Verdauungsdepression. Landw. Vers. Sta. 92, 57-126. Sheep: *quackgrass meal*; *coffee residue*, (*chicory and coffee grains*), *dry*; *blood meal*; *horn meal*; *ossein*; *tankage*, *glue or "stick"*; *tankage with horn meal*; *tankage*, *absorbed on treated sawdust*, *dried*.

——— UND F. WESTHAUSSER, 1909. Weitere Untersuchungen ueber die Verwertung der nicht-Eiweissartigen Stickstoffverbindungen der Futtermittel sowie der Ammonsalze durch das milchgebende Tier. Landw. Vers. Sta. 71, 1-170. Sheep: hay, meadow, Europe; *malt sprout extract*.

## MORGEN, BEGER, UND WESTHAUSSER, continued

- 1911. Ueber den Futterwert des frischen Grases und des daraus gewonnenen Trockenfutters. Landw. Vers. Sta. 75, 321-348. Sheep: hay, meadow, dehydrated, Europe; grass mixed, fed green, Europe. Goats: hay, meadow, dehydrated, Europe; grass mixed, fed green, Europe.
- H. WAGNER, G. SCHOELER, UND E. OHLMER, 1919. Fuetterungsversuche mit Leimkraftfutter an Milchtieren. Landw. Vers. Sta. 94, 219-246. Sheep: *tankage; tankage with horn meal.*
- C. WINDHEUSER, G. SCHOELER, UND E. OHLMER, 1922. Ueber die Verdaulichkeit verschiedener Fabrikate entbitterter Lupinen und ueber die Verwertung derselben bei der Milchproduktion. Landw. Vers. Sta. 99, 295-357. Sheep: hay, meadow, Europe; *beet tops, sugar, dried; lupine seed.*
- MORROW, K. S., AND J. P. LAMASTER, 1929. Ground hay for milk production. S. C. Agr. Expt. Sta. Bul. 225, 1-31. Cows: alfalfa hay; oat vetch mixed hay; soybean hay.
- MUELLER, H. G., 1931. Haferersatz durch frische Kartoffelschlempe bei der Fuetterung von Arbeitspferden. (Sechster Beitrag zur Ausbildung des wissenschaftlichen Pferdefuetterungsversuches in der Praxis.) Landw. Jahrb. 73, 169-217. Horses: *potato spent residue.*
- MUENTZ, A., 1880. Recherches sur la digestion des fourrages employées dans l'alimentation des chevaux. De la digestibilité des fourrages donnés isolement. Inst. Natl. Agron. Paris, Ann. 5, 195-227. Horses: hay, meadow, Europe; wheat straw; beans, seed; corn, grain; oats, grain; wheat bran.
- ET A. C. GIRARD, 1880. Recherches sur la valeur alimentaire du foin. Inst. Natl. Agron. Paris, Ann. 5, 229-244. Horses: hay, meadow, Europe.
- 1883a. Recherches sur la valeur alimentaire d l'avoine. Inst. Natl. Agron. Paris, Ann. 8, 161-182. Horses: oats, grain.
- 1883b. Recherches sur la digestion des fourrages employées dans l'alimentation des chevaux. Inst. Natl. Agron. Paris, Ann. Ministre de l'Agr. 8, 183-201. Horses: carrots, roots; buckwheat seed; horsebeans, seed.
- 1884a. Recherches sur la valeur alimentaire de l'orge. Inst. Natl. Agron. Paris, Ann. 9, 91-100. Horses: barley, grain.
- 1884b. Études sur le topinambour. Inst. Natl. Agron. Paris, Ann. 9, 101-134. Horses: sunflower tubers; Jerusalem-artichoke.
- 1898. Recherches sur la valeur alimentaire de la luzerne. Inst. Natl. Agron. Paris, Ann. 24, 5-38. Horses: alfalfa hay; alfalfa leaves, stemmy, dry; alfalfa stems, dry; alfalfa grass mixed hay; alfalfa, fed green.
- MYBURGH, S. J., 1937. The digestibility of South African feeds. I. The digestibility coefficients of some natural grasses. Onderstepoort Jour. Vet. Sci. and Anim. Indus. 9, 165-184. Sheep: alfalfa hay; fingergrass hay; panicum hay.
- NAUMANN, K., 1940. Beitrage zur Kenntnis der Verdaulichkeit der pflanzlichen Rohfaser und ihrer Bestandteile. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 193-246. Sheep: *cotton.*
- NAUMOV, P., 1929. Nutritional value of ground blue lupine seed, bitterness extracted. Leningrad Selsk. Khoz. Inst. Zap. (Zootechnik Expt. Sta. Agr. Inst. Leningrad) 7, 334-341. Sheep: hay, meadow, Europe; *lupine seed, bitterness extracted.*

- NEBELSIEK, H., 1936. Der Einfluss neuerer Sicherungszusätze bei der Einsäuerung grüner Futterpflanzen auf die Zusammensetzung und den Nährwert des gewonnenen Gaerfutters. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 8, 161-185. Sheep: clover hay, red; hay, meadow, Europe; *clover silage, red, PCl<sub>3</sub> added; clover silage, red, SO<sub>3</sub> added; clover silage, red, sugar added.*
- NEDOCHETOVA, E., AND N. GORIAINOVA, 1927. The chemical composition and digestibility of different cuttings of alfalfa. Saratovsk. Gosud. Inst. Selsk. Khoz. i. Meliar. Izv. 3, 99-105. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; alfalfa hay, 4th cutting.
- NEHRING, K., 1935. Der Einfluss von Reaktion und Düngung auf die Zusammensetzung und Verdaulichkeit des Wiesengrases. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 444-462. Sheep: hay, meadow, Europe; hay, meadow, limed, Europe; hay, meadow, 2d cutting, limed, Europe.
- 1938. Der Einfluss von Reaktion und Düngung auf die Zusammensetzung und die Verdaulichkeit des Wiesengrases. Landw. Jahrb. 86, 245-279. Sheep: hay, upland, Europe; marsh hay.
- UND A. KELLER, 1932. Ueber den Einfluss von Bodenreaktion und Düngung auf die Zusammensetzung eines Gemisches verschiedener Gras- und Kleearten. (Unter besonderer Berücksichtigung der Verdaulichkeit.) 2. Mitteilung. Landw. Jahrb. 75, 931-951. Sheep: hay, meadow, Europe; hay, meadow, acid soil, Europe; hay, meadow, alkaline soil, Europe; hay, meadow, fertilized, Europe; hay, meadow, fertilized and limed, Europe; hay, meadow, limed, Europe; hay, meadow, 2d cutting, Europe; hay, meadow, 2d cutting, limed, Europe.
- UND P. MALKOMESIUS, 1938. Fütterungsversuche mit Hautfuttermehl an Schweinen. Ein Beitrag zur Frage des Eiweissersatzes durch "Amide." VI. Mitteilung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 549-552. Swine: *skin meal.*
- UND W. SCHRAMM, 1937a. Ueber die Verdaulichkeit einiger neuer Harnstofffuttermittel. Landw. Vers. Sta. 128, 191-197. Sheep: *beet pulp, urea added, dried; wheat bran, molasses and urea added.*
- 1937b. Ueber die Zusammensetzung und Verdaulichkeit der Leinkapselspreu. Landw. Vers. Sta. 128, 237-256. Sheep: *linseed capsule chaff; linseed capsule chaff, molasses added, dry.* Swine: *linseed capsule chaff; linseed capsule chaff, molasses added, dry.*
- 1938. Ueber die Zusammensetzung und Verdaulichkeit eines neuen Kartoffel-Eiweiss-Futtermittels. (Kartoffeltrockensaft-Puelpflocken.) Landw. Vers. Sta. 129, 28-33. Swine: *barley, grain; potato-protein pulp flakes.*
- 1939a. Ausnutzung verschiedener Futterstoffe durch Kaninchen. IV. Vergleichende Untersuchungen mit Hammeln und Schweinen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 11, 301-321. Sheep: alfalfa hay; hay, meadow, Europe; lupine hay, sweet yellow; alfalfa silage. Swine: *barley, grain; corn, grain.*
- 1939b. Die Zusammensetzung und Verdaulichkeit von extrahierten Roggenkeimen und extrahierter Roggenkleie. Ztschr. f. Tierernaehr. u. Futtermittelk. 2, 55-65. Sheep: hay, meadow, Europe; *rye bran; rye germ meal.* Swine: *rye bran; rye germ meal.*
- 1939c. Ueber die Ausnutzung von Brauereiabfallhefe in frischem, gekochtem und getrocknetem Zustand. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 97-108. Swine: *yeast, wet; yeast, dried.*
- 1940. Ueber die biologische Wertigkeit des Eiweisses verschiedener Gerstensorten bei wachsenden Schweinen und ihre Beeinflussung durch Stickstoffdüngung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 473-500. Swine: *barley, grain; barley, grain, hull-less or bald.*

## NEHRING UND SCHRAMM, continued

- 1941. Ueber die Verwertung der Brauereiabfallhefe. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 163-179. Swine: yeast, boiled, pressed; yeast, wet.
- 1942. Ueber die Zusammensetzung und den Futterwert von Wruken und Ruebenblatt. Ztschr. f. Tierernaehrung und Futtermittelk. 6, 177-192. Sheep: beet tops, sugar, dried; beet tops, sugar, dehydrated; rutabaga tops, dried; turnip tops, dried; rutabaga top silage.
- UND P. MALKOMESIUS, 1939. Ueber den Futterwert von Suess-lupinengut. (Ausnuetzungsversuche an Hammeln. Milchkuhversuche und Mastversuche an Laemmern.) Ztschr. f. Tierernaehr. u. Futtermittelk. 2, 45-54. Sheep: lupine hay, sweet yellow, dehydrated.
- NEIDIG, R. E., R. S. SNYDER, AND C. W. HICKMAN, 1921. Sunflower silage digestion experiments with cattle and sheep. Jour. Agr. Res. 20, 881-888. Cows: sunflower silage. Sheep: sunflower silage.
- NEUMANN, R., UND A. LOESCHE, 1912. Lupinenflocken. Landw. Vers. Sta. 78, 253-264. Sheep: hay, meadow, Europe.
- NEVENS, W. B., 1924. The sunflower as a silage crop: Feeding value for dairy cows; composition and digestibility when ensiled at different stages of maturity. Ill. Agr. Expt. Sta. Bul. 253, 185-225. Cows: sunflower silage.
- 1933. Varieties and types of corn for silage. Ill. Agr. Expt. Sta. Bul. 391, 106-109. Steers: corn cannery refuse silage. Sheep: corn silage; corn silage, large immature.
- NEWLANDER, J. A., 1935a. The digestibility of artificially dried Sudangrass. Vt. Agr. Expt. Sta. Bul. 386, 3-8. Cows: sorghum: Sudangrass hay, dehydrated.
- 1935b. The digestibility of artificially dried roughages. Vt. Agr. Expt. Sta. Bul. 400, 3-12. Cows: Japanesemillet hay, dehydrated; oat hay, dehydrated; soybean hay, dehydrated; sorghum: Sudangrass hay, dehydrated.
- H. B. ELLENBERGER, O. M. CAMBURN, AND C. H. JONES, 1938. Digestibility of alfalfa, timothy and soybeans as silage and as hays. Vt. Agr. Expt. Sta. Bul. 430, 3-24. Cows: alfalfa hay; alfalfa hay, dehydrated; soybean hay; soybean hay, dehydrated; timothy hay; timothy hay, dehydrated; alfalfa silage; alfalfa silage, sun-wilted; alfalfa silage, sun-wilted, molasses added; alfalfa silage, molasses added; soybean silage; soybean silage, sun-wilted; soybean silage, molasses added; soybean silage, sun-wilted, molasses added; timothy silage; timothy silage, sun-wilted; timothy silage, sun-wilted, molasses added; timothy silage, molasses added.
- 1940. The conservation of alfalfa, timothy and soybean nutrients as silages and as hays. Vt. Agr. Expt. Sta. Bul. 459, 2-42. Cows: alfalfa hay; alfalfa hay, dehydrated; soybean hay; soybean hay, dehydrated; timothy hay; timothy hay, dehydrated; alfalfa silage; alfalfa silage, sun-wilted; alfalfa silage, sun-wilted, molasses added; alfalfa silage, molasses added; soybean silage; soybean silage, sun-wilted; soybean silage, molasses added; soybean silage, sun-wilted, molasses added; soybean silage,  $H_2PO_4$  added; timothy silage; timothy silage, sun-wilted; timothy silage, sun-wilted, molasses added; timothy silage, molasses added; timothy silage, A. I. V.; timothy silage,  $H_2PO_4$  added.
- AND C. H. JONES, 1942. The conservation of nutrients in grass silage. Vt. Agr. Expt. Sta. Bul. 485, 3-11. Cows: timothy grass weeds mixed hay; timothy grass weeds mixed hay, 2d cutting; clover grass mixed silage, molasses added; clover timothy mixed silage, molasses added; timothy grass mixed silage, molasses added.

## NEWLANDER, continued

- AND C. H. JONES, 1932. The digestibility of artificially dried grass. Vt. Agr. Expt. Sta. Bul. 348, 3-20. Cows: grass mixed, immature, dehydrated; grass mixed, immature, fed green, Eastern United States.
- NIEDENZU, G., 1940. Eiweissersatz bei Jungfohlen durch Gaerfutter. Jour. f. Landw. 87, 107-150. Horses: beets, sugar, roots; clover silage, crimson.
- NIESCHLING, H., 1934. Ueber die Eignung und Verdaulichkeit roher Kartoffeln als Futter fuer landwirtschaftliche Arbeitspferde. Ztschr. f. Spiritusindus. 36-38, 212-232. Horses: potatoes, tubers.
- 1935. Ueber die Verdaulichkeit roher Mohrrueben bei der Fuetterung an Arbeitspferde. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 32, 331-348. Horses: carrots, roots.
- NIETSCH, H., 1935. Ueber Zusammensetzung, Naehrstoffgehalt und Verdaulichkeit des Weidegrases; Experimentaluntersuchungen ueber die Ernaehrung der Fohlen auf der Weide. Landw. Jahrb. 81, 525-575. Horses: grass mixed pasture, Europe.
- NOELLE, E., 1941. Vergleichende Untersuchungen ueber die Verdaulichkeit des Rohproteins im Tierversuch und auf kuenstlichem Wege. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 279-312. Sheep: alfalfa hay, 2d cutting; alfalfa, 2d cutting, fed green; alfalfa, 3d cutting, fed green.
- PATTERSON, H. J., 1893. The composition and digestibility of the different parts of corn fodder. Md. Agr. Expt. Sta. Bul. 20, 1-15. Steers: corn husks, dry; corn leaves, dry; corn stubble (stalk below the ear, no leaves) dried; corn tops, dried.
- 1896. Report upon the value of a new corn product. Md. Agr. Expt. Sta. Bul. 43, 165-186. Steers: corn husks and leaves, dry; corn stover, dry; corn stover, pith removed, chopped, dry; corn stover, pith removed, chopped, steamed; wheat bran.
- 1897. Horse feeding: Tests of the digestibility of oats, corn hay and the "new corn product." Md. Agr. Expt. Sta. Bul. 51, 11-44. Horses: timothy hay; corn stover, pith removed, chopped, dry; corn, grain; oats, grain.
- AND R. OUTWATER, 1907. The digestibility of molasses feeds. Md. Agr. Expt. Sta. Bul. 117, 259-290. Steers: clover heavy timothy mixed hay.
- AND H. J. WHITE, 1912. By-product feeds. Md. Agr. Expt. Sta. Bul. 168, 1-21. Steers: flax plant by-product, dry; buckwheat middlings; rye distillers' dried grains; screenings, grain.
- PFEIFFER, G., 1937. Die Kakaoschalen als Futtermittel. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 8, 148-158. Sheep: cocoa shells.
- 1941. Die Erhaltung von Gruenfutter in Behaeltern. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 1-37. Sheep: bean corn pea vetch mixed silage; bean corn pea vetch mixed silage, HCOOH added; bean corn pea vetch, mixed silage, HCONH<sub>2</sub>NaNO<sub>3</sub> added; bean corn pea vetch mixed silage, H<sub>2</sub>SO<sub>4</sub> added; clover, crimson, vetch mixed silage, Ca(CHO<sub>2</sub>)<sub>2</sub> and NaNO<sub>3</sub> added; clover, crimson, vetch mixed silage, H<sub>2</sub>SO<sub>4</sub> added; clover, red, oat vetch mixed silage, HCONH<sub>2</sub>NaNO<sub>3</sub> added; clover, red, ryegrass mixed silage, Ca(CHO<sub>2</sub>)<sub>2</sub> and NaNO<sub>3</sub> added.
- PFEIFFER, T., 1885. Beitrage zur Frage ueber die Bestimmung der Stoffwechselprodukte im thierischen Koth. Jour. f. Landw. 33, 149-192. Swine: barley, grain.

PFEIFFER, continued

- UND A. EINECKE, 1904. Die Verdaulichkeit des Torfes als Melassetraeger. Breslau Landw. Inst., Mitt. 2, 683-694. Sheep: *peat*.
- — — — — 1905. Die Verdaulichkeit verschiedener Melassetraeger mit besonderer Beruecksichtigung des Mineralstoffumsatzes. Breslau Landw. Inst., Mitt. 3, 547-565. Sheep: *peat; wood sawdust, dry*.
- UND F. LEHMANN, 1886. Ueber die Verdaulichkeit der bei den Mastversuchen mit Hammeln verwandten Futtermittel. Jour. f. Landw. 34, 83-119. Sheep: hay, meadow, Europe; *beets, sugar, roots; beet pulp, dried*.
- PHELPS, C. S., 1898. Digestion experiments with sheep. Conn. (Storrs) Agr. Expt. Sta. 11th Ann. Rpt., 204-220. Sheep: grass mixed hay, 2d cutting; barley fodder, fed green; barley pea mixed fodder, fed green; corn fodder, sweet, fed green; oat pea mixed fodder, fed green; soybean fodder, fed green.
- AND A. P. BRYANT, 1896. Digestion experiments with sheep. Conn. (Storrs) Agr. Expt. Sta. 9th Ann. Rpt., 246-272. Sheep: clover hay, 2d cutting; clover hay, 2d cutting, air dried; clover grass mixed hay, 2d cutting; grass mixed hay, 2d cutting; Japanesemillet fodder, fed green; oat hay; corn fodder, sweet, fed green; cowpea fodder, fed green; oat fodder, fed green; oat pea mixed fodder, fed green; soybean fodder, fed green.
- AND C. D. WOODS, 1894. Digestion experiments with sheep. Conn. (Storrs) Agr. Expt. Sta. 7th Ann. Rpt., 107-134. Sheep: clover hay, crimson; grass mixed hay, 2d cutting; timothy grass weeds mixed hay, 2d cutting; barley fodder, fed green; barley pea mixed fodder, fed green; clover, crimson, fed green.
- — — — — 1895. Digestion experiments with sheep. Conn. (Storrs) Agr. Expt. Sta. 8th Ann. Rpt., 187-214. Sheep: clover, 2d cutting, fed green; clover hay, crimson; clover hay, crimson, air dried; barley fodder, fed green; clover grass mixed fodder, fed green; corn fodder, sweet, fed green; cowpea fodder, fed green; millet fodder, foxtail, fed green; oat fodder, fed green; oat pea mixed fodder, fed green; pea fodder, fed green; soybean fodder, fed green.
- PLATIKANOFF, N. VON, UND I. POPOFF, 1937. Composition and nutritive value of wheat screenings; simplification of the method for determination of the digestibility and nutritive value of fodder. Sofiisk. Univ. Agron. Lesov. Fakult. God. (Faculté d'Agron. et Sylvic. Ann.) 16, 400-429. Sheep: alfalfa hay; *wheat screenings*.
- POIJAERVI, I., 1934. Influence of the time of harvesting on the composition and feeding value of hay. Nord. Jordbrugsforsk. 520-524. Sheep: clover grass timothy weeds mixed hay; clover timothy mixed hay; clover timothy weeds mixed hay; timothy hay; timothy grass weeds mixed hay.
- POMMER, E., 1921. Maiskuchen, seine Zusammensetzung und sein Futterwert. Landw. Vers. Sta. 98, 243-248. Sheep: hay, meadow, Europe; *corn oil meal; palm kernel oil meal*.
- POPOFF, I., 1928. Comparative studies of the composition and digestibility of cereal straws. Sofiisk. Univ. Agron. Lesov. Fakult. God. (Faculté d'Agron. et Sylvic. Ann.) 6, 361-394. Sheep: hay, meadow, Europe; oat vetch mixed hay; *barley straw; barley straw, winter; oat straw; wheat straw, winter*.
- — — — — 1937. The digestibility and food value of corn and of corn ground with corn cobs. Sofiisk. Univ. Agron. Lesov. Fakult. God. (Faculté d'Agron. et Sylvic. Ann.) 15, 96-113. Sheep: hay, meadow, Europe; *corn, grain; corn and cob meal*.



- PRESCOTT, J. A., 1920. The digestibility of Berseem. Sultan. Agr. Soc. Tech. Sect. Bul. 5. Sheep: clover, Egyptian, fed green; clover, Egyptian, 1st cutting, fed green; clover, Egyptian, 2d cutting, fed green; clover, Egyptian, 3d and 4th cutting, fed green.
- PUCCI, C., 1913. Utilization of feed in the Zebu. Mod. Zooiatro, Parte Sci. 2, 41-50. Steers: hay, meadow, Europe.
- RATHER, J. B., 1917. The digestibility of some Arkansas feeds for hogs. Ark. Agr. Expt. Sta. Bul. 133, 3-16. Swine: corn, grain; *cottonseed feed*; *cottonseed meal*; oats, grain; rice bran; rice polishings; sorghum grain, kafir; *wheat bran*; wheat gray shorts.
- REHBOCK, H. J., 1933. Vergleichende Untersuchungen ueber die Konservierungsverluste und den Futterwert von Wiesengras 1. und 2. Schnitt bei Feimengrasserstellung, Silofutterbereitung und Heuwerbung. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 26, 163-191. Sheep: hay, meadow, Europe; hay, meadow, air dried, Europe; grass silage, Europe; *grass silage, stack, Europe*; *grass silage, HCl added*.
- REHM, E., 1935. Die Einsaeuerung eiweissreichen Gruenfutters unter besonderer Beruecksichtigung der Kaltvergaerung mit luftdichtem Deckelverschluss und die Bewertung des Gaerfutters durch den Tierversuch. Landw. Jahrb. 82, 215-252. Sheep: alfalfa silage; alfalfa silage,  $PCl_5$  added.
- RICHTER, K., 1940. Untersuchungen ueber den Futterwert kuenstlich getrockneter Gruenfuttermittel. Forschungsdienst. 10, 573-579. Swine: *alfalfa hay, dehydrated*; *clover, crimson, ryegrass vetch mixed hay*; *horsebean vetch mixed hay*; *lupine hay, sweet yellow, dehydrated*; *barley corn horsebean sweet lupine oat vetch mixed fodder, dry*; *beet crowns and tops, sugar, dehydrated*; *rape, dehydrated*.
- UND H. BRUEGGEMANN, 1935. Die chemische Zusammensetzung und der Futterwert des Heues der verschiedenen Schnittzeiten. Landw. Jahrb. 81, 29-39. Sheep: marsh hay.
- 1937a. Der Futterwert von Holzzuckerhefe. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 9, 95-105. Sheep: hay, meadow, Europe; *yeast, wood sugar*. Swine: barley, grain; *yeast, wood sugar*.
- 1937b. Kakaoschalen als Futtermittel. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 9, 184-188. Sheep: *cocoa shells*.
- UND J. HERBST, 1938. Der Futterwert von gruener Malve nach Untersuchungen am Schwein und am Wiederkaeuer. Landw. Jahrb. 85, 615-623. Sheep: mallow, fed green. Swine: *mallow, fed green*; barley, grain.
- UND R. EHINGER, 1938. Der Futterwert von Sulfitablaugenhefe. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 235-240. Sheep: hay, meadow, Europe; *yeast, sulfite waste liquors, dried*. Swine: barley, grain; *yeast, sulfite waste liquors, dried*.
- 1939. Untersuchungen ueber den Futterwert kuenstlich getrockneter Gruenfuttermittel. Forschungsdienst 8, 225-232. Sheep: *alfalfa hay, dehydrated*; *bean vetch mixed hay, dehydrated*; *clover hay, crimson*; *clover, crimson, ryegrass vetch mixed hay, dehydrated*; *hay, meadow, 2d cutting, dehydrated, Europe*; *lupine hay, sweet yellow, dehydrated*; *barley corn horsebean sweet lupine oat vetch mixed fodder, dry*; *beet crowns and tops, sugar, dehydrated*; *rape, dehydrated*.
- 1940. Der Futterwert von Hanfabfaellen. Ztschr. f. Tierernaehr. u. Futtermittelk. 4, 81-88. Sheep: *hemp screenings*. Swine: *hemp screenings*.

RICHTER, continued

- UND K. E. FERBER, 1933a. II. Verfuetterung von Lupinensilage. Die Futterkonservierung 4, 26-33. Sheep: *lupine silage, bitter blue*.
- ——— 1933b. Der Futterwert von gruenem Markstammkohl und die Verfuetterung an Milchvieh im Herbst und Winter. Deut. Landw. Gesell. Mitt. 48, 629-630. Sheep: *kale, marrow, fed green; kale silage, marrow*.
- UND K. CHRZASZCZ, 1932. Untersuchungen ueber den Futterwert von Sauerfutter aus Stoppelklee und die Wirkung der Verfuetterung der Silagen auf die Menge und den Fettgehalt der Milch von Kuehen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 4, 522-531. Sheep: *clover silage*.
- ——— P. MOLDRICKX, UND K. CHRZASZCZ, 1933. Ermittlung der Einwirkung des nachtraeglichen Waschens auf die Zusammensetzung und den Futterwert eingesaeuerten Zuckerruebenkrautes. Wiss. Arch. f. Landw. Abt. B, Arch. f. Tierernaehr. u. Tierzuecht. 8, 159-170. Sheep: *beet crown and top silage, sugar*.
- UND H. GAFERT, 1941. Futterwert und Futterwirkung von getrockneter Sulfitablaugenhefe nach Untersuchungen an Wiederkaeuern und an Schweinen. Ztschr. f. Tierernaehr. und Futtermittelk. 6, 79-88. Sheep: *hay, meadow, Europe; yeast, sulfite waste liquors, dried*. Swine: *barley, grain; yeast, sulfite waste liquors, dried*.
- UND J. HERBST, 1937. Der Futterwert von gruenem und eingesaeuertem Sudangras (*Sorghum halepense*) und die Futterwirkung bei Verfuetterung an Milchkuehe. Landw. Vers. Sta. 129, 1-11. Sheep: *sorghum fodder, Sudangrass, fed green; sorghum silage, Sudangrass*.
- ——— 1938. Untersuchungen ueber den Futterwert und die Futterwirkung eines unter Bakterienzusatz eingesaeuerten Gemenges aus Erbsen, Wicken und Peluschken im Vergleich zu unbehandeltem Gaerfutter gleicher Zusammensetzung. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 10, 59-67. Sheep: *hay, meadow, Europe; pea vetch mixed silage*.
- UND R. EHINGER, 1938. Untersuchungen ueber den Futterwert von kuenstlich getrockneten Suesslupinen und ueber die Futterwirkung bei der Verfuetterung an Milchkuehe. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 24-32. Sheep: *lupine hay, sweet, dehydrated*.
- RINGEN, J., 1939. Fuetterungsversuche mit Tangmehl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 11, 465-486. Sheep: *rockweed, dry; blade-kelp, dry*. Swine: *rockweed, dry; bladekelp, dry*.
- RISSER, A. K., 1904. Composition and digestibility of distillers' dried grains. Pa. State Col. Ann. Rpt., 231-238. Sheep: *timothy hay; distillers' dried grains*.
- RITZMAN, E. G., AND F. G. BENEDICT, 1938. Nutritional physiology of the adult ruminant. Carnegie Inst. Wash., Pub. 494, 1-200. Cows: *alfalfa hay; alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; clover hay, red; oat hay; soybean hay; timothy hay; corn, grain*.
- ROSS, J. C., AND A. M. BOSMAN, 1927. Digestibility of teff hay for sheep. Pretoria Univ. Bul. 10, Union So. Africa Dept. Agr. and Forestry. Sheep: *teff hay*.
- ——— AND L. P. VAN WYK, 1931. Digestibility of teff hay, maize oil cake and lucerne hay for cattle. Pretoria Univ. Bul. 20, 1-23. Steers: *alfalfa hay; teff hay; corn oil meal*.
- SANSON, A., 1888. Recherches expérimentales sur la puissance digestive comparée du cheval de l'ane et du mulet. Jour. de l'Anat. et de la Physiol. Paris, 46-66. Horses: *hay, meadow, Europe*.
- SCHARRER, K., UND H. NEBELSIEK, 1938a. Untersuchungen ueber die Verdaulichkeit von Lampes krausblaettriger Futtermalve an Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 1-10. Sheep: *mallow, curly, fed green*.

## SCHARRER UND NEBELSIEK, continued

- 1938b. Untersuchungen ueber die Verdaulichkeit von Sojabohnenstroh und Sojabohnenstroh-Melasse an Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 72-81. **Sheep:** hay, meadow, Europe; soybean straw; soybean straw meal.
- 1938c. Untersuchungen ueber die Verdaulichkeit roher und gedaempfter Sojabohnen an Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 1, 82-88. **Sheep:** hay, meadow, 2d cutting, Europe; *soybeans, seed; soybeans, seed, steamed.*
- 1939. Versuche ueber Gaerfutterbereitung mit Lampes krausbluettriger Futtermalve und ueber die Verdaulichkeit des Gaerfutters bei Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 15-26. **Sheep:** hay, meadow, Europe; *beet top curly mallow mixed silage; corn curly mallow mixed silage.*
- UND R. SCHREIBER, 1939. Untersuchungen ueber die Verdaulichkeit von frischer Luzerne, Luzerneheu, Luzernemehl und Luzernegaerfutter an Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 3, 27-44. **Sheep:** alfalfa hay; hay, meadow, Europe; alfalfa, fed green; *alfalfa silage, organic acids or bacteria added; alfalfa silage, H<sub>2</sub>SO<sub>4</sub> added.*
- 1940a. Ueber die Verdaulichkeit von Saflor (*Carthamus tinctorius*) im frischen und eingesauerten Zustand bei Schafen. Ztschr. f. Tierernaehr. u. Futtermittelk. 4, 42-53. **Sheep:** hay, meadow, Europe; *safflower fodder, fed green; safflower silage.*
- 1940b. Eiensauerungsversuche mit Silomais und Verdauungsversuche mit verschieden hergestelltem Maisgaerfutter an Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 46-76. **Sheep:** hay, meadow, Europe; *corn silage; corn silage, sugar added.*
- 1940c. Versuche ueber die Verdaulichkeit der Phacelia (*Phacelia tanacetifolia*) im frischen, getrockneten und eingesauerten Zustand bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 258-277. **Sheep:** hay, meadow, Europe; *phacelia fodder, tansy, dry; phacelia fodder, tansy, fed green; phacelia fodder, tansy, fed green; phacelia silage, tansy.*
- 1940d. Ueber die Verdaulichkeit der Oelrauke (*Eruca sativa*) im frischen, getrockneten und eingesauerten Zustand bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 277-308. **Sheep:** hay, meadow, Europe; *rocketsalad, dried; rocketsalad, fed green; rocketsalad silage.*
- 1940e. Ueber die Verdaulichkeit verschiedenen hergestellten Sonnenblumen-Gaerfutters bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 12, 520-535. **Sheep:** hay, meadow, Europe; *sunflower silage.*
- 1941a. Ueber die Verdaulichkeit des "Landsberger Gemenges" in frischem, getrocknetem und eingesauertem Zustand bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 229-259. **Sheep:** clover, crimson, ryegrass vetch mixed hay; hay, meadow, Europe; clover, crimson, ryegrass vetch mixed fodder, fed green; *clover, crimson, ryegrass vetch mixed silage.*
- 1941b. Einsauerungsversuche mit Phacelia unter Verwendung eines neuen Sicherungszusatzes und Verdauungsversuche mit den hergestellten Gaerfutterarten an Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 432-450. **Sheep:** hay, meadow, Europe; *phacelia silage, tansy.*
- 1942a. Ueber die Verdaulichkeit von extrahiertem Mohnkuchenschrot bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 165-175. **Sheep:** hay, meadow, Europe; *poppy seed oil meal.*

## SCHARRER UND SCHREIBER, continued

- 1942b. Einsauerungsversuche mit Gruenraps ohne und mit verschiedenen Sicherungszusatzeten und Verdauungsversuche mit Gruenraps im frischen und eingesauerten Zustand zu Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 176-197. Sheep: hay, meadow, Europe; rape, fed green; rape silage, winter.
- 1942c. Ueber die Verwendung von Sauerkartoffeln bei der Einsauerung von Luzerne. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 317-334. Sheep: hay, meadow, Europe; alfalfa silage, organic acids or bacteria added; alfalfa steamed potato mixed silage.
- 1942d. Ueber die Verdaulichkeit von Saflorkuchen bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 335-344. Sheep: hay, meadow, Europe; safflower oil meal.
- 1942e. Ueber die Verdaulichkeit von gedaempften und eingesauerten Kartoffeln bei Schafen. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 14, 345-352. Sheep: hay, meadow, Europe; potato silage, steamed.
- SCHEUNERT, A., W. KLEIN, UND M. STEUBER, 1925. Ueber die Verdaulichkeit und den Naehwert von Roggenkleien verschiedenen Ausmahlungsgrades und von Roggenkeimen bei Schafen. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbil. 3, 343-366. Sheep: clover hay; rye bran; rye feed; rye middlings; rye germ meal.
- SCHMIDT, J., UND E. LAGNEAU, 1932. Verdauungsversuche an Schweinen mit Luzerneheumehl verschiedener Mahlung. Ztschr. f. Schweinezucht. 39, 820-821. Swine: alfalfa hay.
- E. LAUPRECHT, D. DSCHAPARIDSE, UND J. W. HAASE, 1936. Untersuchungen ueber die Zusammensetzung des Weidegrases und den Ertrag einer neuzeitlich bewirtschafteten Milchviehweide. Landw. Jahrb. 82, 319-364. Sheep: clover grass mixed pasture.
- UND M. F. VON SCHLEINITZ, 1933. Zusammensetzung, Verdaulichkeit und Futterwert verschiedener Futterkohlarnten. Zuechtungskunde 8, 81-87. Sheep: hay, meadow, Europe; kale, blue thickstem, fed green; kale, marrow, fed green.
- UND E. LAGNEAU, 1935. Zwei Beitrage zur Kenntnis des Naehr- und Futterwerts der gelben Suesslupine der SEG, Verdauungs- und Stoffwechselversuche mit Suesslupinen an Schweinen und Hammeln. Zuechtungskunde 10, 55-59. Sheep: lupine seed, sweet yellow. Swine: lupine seed, sweet yellow.
- SCHMITZ, N., 1916. Sudangrass. Md. Agr. Expt. Sta. Bul. 194, Steers: sorghum; Sudangrass hay.
- SCHNEIDER, B. H., A. P. BROOKS, N. R. JOSHI, ET AL., 1939. Digestion trials with green juar fodder. The Allahabad Farmer 13, 142-150. Cows: sorghum fodder, juar, fed green, India.
- SCHNEPP, F., 1936. Der Einfluss von Calciumsalzen und Heu auf den Calcium- und Phosphorstoffwechsel von Schafen, die mit angesauertem Gruenfutter ernaeht wurden. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 8, 300-339. Sheep: bean silage, HCl added; vetch mixture silage.
- SCHOLZ, A., 1934. Die rohe Zuckerruebe als Futter fuer schwere Arbeitspferde. Jour. f. Landw. 81, 303-354. Horses: beets, sugar, roots; beet pulp, dried.
- SCHRAMM, W., 1936. Ueber Stickstoffverluste beim Trocken von Schweinekot und ihren Einfluss auf die im Stoffwechselversuch ermittelten Verdauungskoeffizienten. Landw. Vers. Sta. 124, 291-305. Swine: barley, grain; pork cracklings, ground; whale meal.

- SCHULTZ, J., H. AUGUSTIN, UND H. FINZENHAGEN, 1935. Eingesaeuertes Kartoffelkraut als Futter fuer Milchkuehe. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 7, 517-531. **Sheep:** potato top silage, sugar added.
- SCHULZE, E., UND M. MAERCKER, 1871. Untersuchungen ueber die sensibeln Stickstoff-Einnahmen und Ausgaben des volljaehrigen Schafs und die Ausnutzung einiger Futterstoffe durch dasselbe. Jour. f. Landw. 19, 46-76. **Sheep:** hay, meadow, Europe; hay, meadow, Europe; hay, meadow, 2d cutting, Europe.
- 1875. Fuetterungsversuche mit Schafen. Jour. f. Landw. 23, 141-174. **Sheep:** barley, grain; beans, seed; oats, grain; wheat bran; wheat gluten feed.
- SEARS, P. D., V. C. GOODALL, AND I. E. COOP, 1942. Digestibility trials on high-production New Zealand pasture. New Zeal. Jour. Sci. and Technol. (A) 23, 294-301. **Sheep:** clover, white, grass mixed fodder, fed green.
- AND F. B. SILL, 1941. The digestibility by dairy cows of a grass silage. New Zeal. Jour. Sci. and Technol. (A) 23, 50-56. **Cows:** clover grass mixed silage.
- AND R. B. NEWBOLD, 1942. The apparent digestibility of samples of pasture silage. New Zeal. Jour. Sci. and Technol. (A) 24, 91-95. **Cows:** grass silage, New Zealand. **Sheep:** grass silage, New Zealand; grass silage, molasses added.
- SENIOR, J. B., AND E. J. SHEEHY, 1941. The food value of hay as affected by the process of curing. Irish Free State Dept. Agr. Jour. 36, 3-35. **Steers:** clover grass mixed hay; clover grass mixed fodder, fed green. **Sheep:** clover grass mixed hay, dehydrated; grass mixed hay; grass mixed hay, weathered; grass mixed hay, dehydrated; ryegrass hay, Italian; clover grass mixed fodder, fed green; grass mixed, fed green, British Isles; ryegrass, Italian, fed green.
- SHAW, G. W., AND H. F. FRENCH, 1897. Relative digestibility of cheat and clover. Ore. Agr. Expt. Sta. Bul. 47, 3-8. **Steers:** brome hay; clover hay, red, 1st cutting.
- SHEEHY, E. J., J. BROPHY, T. DILLON, AND P. O'MUINEACHAIN, 1942. Seaweed (*Laminaria*) as stock food. Roy. Dublin Soc. Econ. Proc. 3, 150-159. **Swine:** bladekelp, dry.
- SHEPARD, J. H., AND A. E. KOCK, 1909. Digestion coefficients of grains and fodders for South Dakota experiments with sheep. S. Dak. Agr. Expt. Sta. Bul. 114, 525-554. **Sheep:** alfalfa hay; bluegrass hay, Kentucky; brome hay, smooth; cordgrass hay; hay, prairie lowland, South Dakota; hay, prairie upland, South Dakota; marsh hay; wheatgrass hay, bluestem; corn stover, dry; oat straw; sorghum fodder, sorgho or sweet, dry; corn silage; barley, grain; corn, grain; emmer, grain; proso, grain; oats, grain; oats, grain; wheat, grain. **Goats:** brome hay, smooth.
- SHUTTLEWORTH, A. E., 1900. Digestion of oat and pea bran by sheep. Ontario Agr. Col. and Expt. Farm 26th Ann. Rpt., 32-34. **Sheep:** oat shorts; pea bran.
- SMELKUS, G. G., 1924. Zur Kenntnis des Futterwertes von *Taraxacum officinale*. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 1, 449-464. **Sheep:** clover hay; dandelion fodder, common, dry.
- SNELL, M. G., 1934. Machine dried soybean hay for fattening cattle. Digestion of protein. La. Agr. Expt. Sta. Bul. 257, 1-18. **Steers:** soybean hay; soybean hay, dehydrated.
- SNYDER, H., 1893. Digestion experiments. Minn. Agr. Expt. Sta. Bul. 26, 3-40. **Swine:** barley, grain; corn, grain; peas, seed; wheat bran; wheat standard middlings.
- 1894. Digestibility of wheat. Minn. Agr. Expt. Sta. Ann. Rpt., 146-148. **Swine:** wheat, grain.

SNYDER, continued

- AND J. A. HUMMEL, 1903. Alfalfa—its chemical development, feeding value, and digestibility. Minn. Agr. Expt. Sta. 11th Ann. Rpt., 173-180. Steers: alfalfa hay; alfalfa, 3d cutting, fed green. Swine: proso, grain.
- SOTOLA, J., 1921. Studies on digestibility of sunflower silage fed to sheep. Wash. Agr. Expt. Sta. Bul. 161, 3-12. Sheep: sunflower silage.
- 1927. Relation of maturity to the nutritive value of first, second and third cuttings of irrigated alfalfa. Jour. Agr. Res. 35, 361-383. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; alfalfa hay, 3d cutting.
- 1933a. The nutritive value of winter-wheat straw. Amer. Soc. Anim. Prod. Proc., 189-192. Sheep: wheat straw, winter.
- 1933b. The nutritive value of alfalfa leaves and stems. Jour. Agr. Res. 47, 919-945. Sheep: alfalfa hay, 1st cutting; alfalfa hay, 3d cutting; alfalfa stems, 1st cutting, dry; alfalfa stems, 2d cutting, dry; alfalfa stems, 3d cutting, dry; alfalfa leaves and blossoms, 1st cutting, dry; alfalfa leaves, 2d cutting, dry; alfalfa leaves, 3d cutting, dry.
- 1936. Digestion experiments with mixtures of sweet clover and albit wheat forage ensiled and cured as hay. Amer. Soc. Anim. Prod. Proc. 29, 143-147. Sheep: sweetclover wheat mixed hay; *sweetclover wheat fodder mixed silage*.
- 1937. The chemical composition and nutritive value of certain cereal hays as affected by plant maturity. Jour. Agr. Res. 54, 399-415. Sheep: barley hay; oat hay; wheat hay.
- 1940a. The chemical composition and apparent digestibility of nutrients in crested wheat grass harvested in three stages of maturity. Jour. Agr. Res. 61, 303-311. Sheep: wheatgrass hay, crested; wheatgrass, crested, immature, dried; wheatgrass, crested, immature, fed green.
- 1940b. Digestibility of nutrients in four varieties of sweetclover hay. Jour. Agr. Res. 61, 887-891. Sheep: sweetclover hay.
- 1941. The chemical composition and apparent digestibility of nutrients in smooth brome grass harvested in three stages of maturity. Jour. Agr. Res. 63, 427-432. Sheep: brome hay, smooth; brome, smooth, fed green.
- STEENSBERG, V., AND J. E. WINTHER, 1938. Digestibility of sweet lupines for cattle. K. Vet. og Landbohøjskoles de Beret. fra Forsøgslab. Copenhagen 177, 42-51. Cows: lupine fodder, sweet, fed green; lupine silage, sweet, A. I. V. Steers: lupine silage, sweet, A. I. V.
- STEINER, W., 1936. Untersuchungen ueber die Konservierung von Gruenfutter nach dem Verfahren von A. I. Virtanen. Landw. Vers. Sta. 124, 1-86. Sheep: clover grass mixed fodder, fed green; *clover grass mixed silage*; *clover grass mixed silage*, A. I. V.
- STEURER, M., UND H. STOTZ, 1931. Ein Vergleich der aus der chemischen Analyse berechneten Staerkewerteinheiten mit denen, die mit Hilfe des Tierversuches aus den gefundenen Verdauungskoeffizienten ermittelt wurden. Wiss. Arch. f. Landw. Abt. B, Arch. f. Tierernaehr. u. Tierzucht. 5, 188-200. Sheep: bluegrass hay, Kentucky; fescue hay, meadow; fescue hay, red; ryegrass hay.
- STUTZER, A., 1915a. Versuche um die aus Sphagnumtorf bestehende Torfstreu als Futtermittel verwertbar zu machen. Landw. Vers. Sta. 87, 213-227. Sheep: hay, meadow, Europe; *peat, treated with HCl*; *rye straw, treated with HCl, dried*.
- 1915b. Fuetterungsversuche mit aufgeschlossenem Roggenstroh. Landw. Vers. Sta. 87, 228-236. Sheep: *rye straw*.



STUTZER, continued

— UND S. GOY, 1913. Die Verdaulichkeit von Lupineflocken. Landw. Vers. Sta. 79-80, 219-228. **Sheep:** hay, meadow, Europe; *lupine seed, bitterness extracted.*

— UND E. HAUPT, 1915. Die Verdaulichkeit der Kiefernadeln. Landw. Jahrb. 48, 571-585. **Sheep:** hay, meadow, Europe; *conifer needles, pine, fresh; conifer needles, pine, alcohol extracted, collected from ground; conifer needles, pine, alcohol extracted, collected from tree, dried; potato flour.*

SWANSON, E. W., AND H. A. HERMAN, 1943. The nutritive value of Korean lespedeza proteins and the determination of biological values of proteins for growing dairy heifers. Mo. Agr. Expt. Sta. Bul. 372, 1-62. **Cows:** lespedeza hay, Korean; *lespedeza seed; soybean oil meal, hydraulic or expeller process.*

SWESHNIKOWA, E. G., 1929. Influence of relative vitamin value of milk on growth, digestion, nitrogen and mineral metabolism in calves. Leningrad. Selsk. Khoz. Inst. Zap. (Inst. Agron. Leningrad, Mem.) 7, 120-142. **Calves:** milk, cow's.

TANGL, F., 1902. I. Untersuchungen ueber den Einfluss der Art des Traenkens auf die Ausnueztung des Futters. II. Zur Kenntnis des Futterwerts des Rieselwiesenheues. III. Beitrag zur Kenntnis des anorganischen Stoffwechsels beim Pferde. Landw. Vers. Sta. 57, 329-404. **Horses:** alfalfa clover grass mixed hay; alfalfa grass mixed hay; grass mixed hay; grass weeds mixed hay.

— M. KORBULY, UND S. WEISER, 1905. Ueber die chemische Zusammensetzung und den Naehrwert des Hafers. Landw. Jahrb. 34, 1, 65-92. **Sheep:** hay, meadow, Europe; hay, mountain, Europe; *oats, grain.* **Horses:** hay, meadow, Europe; hay, mountain, Europe; *oats, grain.*

— UND S. WEISER, 1906. Zur Kenntnis des Naehrwertes einiger Heuart. Landw. Jahrb. 35, 1-2, 159-223; 1906, Beitrage zur Futtermittellehre, Stoffwechselphysiologie der Landw. Nutztiere Heft 1, 1-65. **Steers:** grass mixed hay; hay, meadow, Europe; clover grass heavy sedge mixed silage. **Sheep:** alfalfa orchardgrass mixed hay; grass mixed hay; grass legume mixed hay; hay, meadow, Europe; hay, mountain, Europe; marsh hay. **Horses:** alfalfa grass mixed hay; grass mixed hay; grass legume mixed hay; hay, meadow, Europe; hay, mountain, Europe; marsh hay; clover grass heavy sedge mixed hay; clover grass heavy sedge mixed silage.

— 1908. Ueber den Naehrwert verschiedener Ausreuter. Landw. Jahrb. 37, 1, 106-129. **Steers:** hay, meadow, Europe; *clover seed screenings.* **Sheep:** alfalfa hay; *clover seed screenings; flaxseed screenings, mostly flax dodder.* **Swine:** *clover seed screenings.*

— 1911. III. Untersuchungen ueber die Veraenderungen des Naehrwerts des Futters beim Einsaeuern und ueber die dabei auftretenden Verluste an Naehrstoffen. Landw. Vers. Sta. 74, 263-342. **Sheep:** alfalfa hay; corn stover, dry; *beet crowns and tops, sugar, fed green; alfalfa silage; beet crown and top silage, sugar; corn stover silage.*

— 1913. Ueber den Naehrwert von Maiskoerner-Kolbenschrot. Landw. Vers. Sta. 81, 35-47. **Sheep:** hay, meadow, Europe; *corn and cob meal.*

— UND A. ZAITSCHEK, 1905. Das besen Hirsekorn als Futtermittel. Landw. Jahrb. 34, 3-64. **Steers:** hay, meadow, Europe; *sorghum grain, broomcorn.* **Sheep:** hay, meadow, Europe; *sorghum grain, broomcorn; oats, grain.* **Swine:** *sorghum grain, broomcorn; sorghum grain, broomcorn.* **Horses:** hay, meadow, Europe; *sorghum grain, broomcorn.*

TATARINOWA, N., 1929. Nitrogen metabolism and digestion rates in fattening pigs with dried brewers' grains and barley flour. Leningrad Selsk. Khoz. Inst. Zap. (Zootechnik Expt. Sta. Inst. Detskoje Selo. Leningrad Annals) 7, 320-330. **Swine:** barley, grain; *brewers' dried grains.*

- TAUBERT, F., 1934. Verdauungskoeffizienten und aehnliche Bestimmungen von Gruenfutter (gruener Hafer, Luzerne, Kleegemisch) bei landwirtschaftlichen Arbeitspferden. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 6, 173-202. **Horses:** alfalfa clover mixed hay; alfalfa clover mixed fodder, fed green; oat fodder, fed green.
- THOMANN, W., 1921. Vergleichende Versuche ueber die Zusammensetzung und Verdaulichkeit von Rohstroh und aufgeschlossenem Stroh. Landw. Jahrb. der Schweiz. 668-723. **Sheep:** *wheat straw, winter; wheat straw, winter, treated with NaOH, dry.*
- TITUS, H. W., 1924. Nutritive properties of pinto beans and pinto bean straws and their use as feed for cattle. N. Mex. Agr. Expt. Sta. Bul. 143, 1-73. **Steers:** bean straw, Kidney.
- 1926. The mutual influence of the proportion of the several nutrients in feeds on their digestibility. I. Crude fiber—The digestibility of rations containing varying amounts of paper pulp. N. Mex. Agr. Expt. Sta. Bul. 153, 9-52. **Steers:** alfalfa hay.
- VINSON, A. E., 1911. Nutritive value of cholla fruit. Ariz. Agr. Expt. Sta. Bul. 67, 509-519. **Sheep:** *watergrass hay; cactus, pricklypear, fed green.*
- VOLHARD, J., 1908. Untersuchungen ueber die Zusammensetzung und Verdaulichkeit des auf Rieselfeldern gewonnenen Grasheues. Landw. Vers. Sta. 68, 11-18. **Sheep:** *ryegrass hay.*
- VOELTZ, W., 1919. Ueber die Verwertung der Brauereihefe im Vergleich zu der Mineralhefe durch den tierischen Organismus nach Versuchen an Hunden und an Wiederkauern (Schafen). Wehnschr. f. Brau. 7, 43-45. **Sheep:** *hay, meadow, Europe; yeast, mineral.*
- 1920. Der Ersatz des Nahrungseiweisses durch Harnstoff beim wachsenden Wiederkauer. Der Futterwert des nach dem Beckmannschen Verfahren aufgeschlossenen Strohs und der Spreu. Biochem. Ztschr. 102, 151-227. **Sheep:** *rye straw, treated with NaOH; yeast, mineral.*
- 1928. Untersuchungen ueber die chemische Zusammensetzung und den Futterwert einzelner Graeser. Landw. Kammer f. Ostpreussen Arb. 55, 1-30. **Sheep:** *fescue hay, meadow; fescue hay, meadow; sloughgrass hay, Old World; sloughgrass hay, Old World; timothy hay; timothy hay.*
- UND A. BAUDREXEL, 1912. Ueber die Verwertung des Kartoffelkrautes und der Kartoffelbeeren durch den Wiederkauer (Schaf). Landw. Jahrb. 43, 177-210. **Sheep:** *hay, meadow, Europe; potato seedballs, dry; potato tops with seedballs, dry; potato tops, dry.*
- UND A. DEUTSCHLAND, 1914. Die Verwertung des Kartoffelkrautes als Heu und als Sauerfutter durch Wiederkauer (Schafe und Milchkuhe). Landw. Jahrb. 46, 105-160. **Sheep:** *sunflower fodder, Jerusalem-artichoke, dry; potato tops, dry; potato top silage.*
- W. DIETRICH, UND A. DEUTSCHLAND, 1913. Die Verwertung zweier Hefe-Mischfutter (Strohhaecksel-Hefe und Torfmehl-Holzkohle-Hefe) durch Wiederkauer (Schafe). Landw. Jahrb. 45, 1-27. **Sheep:** *hay, meadow, Europe.*
- 1918. Die Verwertung der Melasse-Amide im Vergleich zum Eiweiss durch den Organismus des Wiederkauers. Landw. Jahrb. 52, 431-455. **Sheep:** *hay, meadow, sewage-irrigated, Europe; casein; molasses distillers' residue.*
- 1921. Die Verdaulichkeit und Verwertung der Naehrstoffe des Oelpilzes (*Endomyces vernalis* Ludwig) durch Carnivoren und Herbivoren (Wiederkauer). Biochem. Ztschr. 114, 111-128. **Sheep:** *hay, meadow, sewage-irrigated, Europe; oil fungus—Endomyces vernalis.*

## VOELTZ, continued

- H. JANTZON, UND H. KORSCH, 1927a. Das fuer die Mahd der Saatwicke am besten geeignete Vegetationsstadium zwecks Verwendung als Gruenfutter oder Silage und im Hinblick auf ihren Hoechstgehalt an verdaulichem Rohprotein und Staerkewert. Die Futterkonservierung 1, 51-62. Sheep: vetch hay, common.
- — — — — 1927b. Ueber die Naehrstoffverluste eines Wicken- und Hafergemisches bei der Warmsaeuregaerung. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 9, 281-287. Sheep: oat pea vetch mixed fodder, fed green; oat pea vetch mixed silage.
- — — — — UND E. REIH, 1923. Maestungs- und Ausnuetzungsversuche an Hammeln mit Harnstoff. Landw. Jahrb. 59, 321-340. Sheep: clover hay; turnips, roots; peanut oil meal; urea.
- — — — — UND W. KIRSCH, 1928a. Naehrstoffgehalt und Futterwert zweier auf dem Halm ueberwinterter Weidegraeser. Ztschr. f. Zuecht. Reihe B, Tierzuecht. u. Zuechtungsbiol. 13, 121-127. Sheep: grass mixed hay, weathered.
- — — — — 1928b. Der Ersatz des Wiesenheues durch Silage derselben Herkunft bei der Fuetterung des Milchviehes. Die Futterkonservierung 1, Heft 5, 81-99. Sheep: hay, meadow, Europe; grass silage, Europe.
- — — — — N. MUHR, A. BAUMANN, UND W. DRAUZBURG, 1914. Ueber den Futterwert des ausgebrauten Hopfens, des Trebers (kuehlgelagert), und der Hefe. Landw. Jahrb. 47, 639-671. Sheep: hay, meadow, Europe; hops, dried spent; yeast, dried. Swine: potato flakes; yeast, dried.
- — — — — I. PAECHTNER, UND A. BAUDREXEL, 1912. Ueber die Verwertung der Trockenhefe durch die landwirtschaftlichen Nutztiere. Landw. Jahrb. 42, 193-253. Sheep: timothy hay; cottonseed feed; yeast, dried.
- — — — — 1913. Ueber den Futterwert der Kartoffelschlempe, ihres Ausgangsmaterials und ueber sog. spezifische Wirkungen der Futterstoffe. Landw. Jahrb. 44, 685-764. Sheep: hay, meadow, Europe; lentils, seed; potato spent residue, dried; potato spent residue and starch, dried.
- — — — — ET AL., 1913. Fuetterungsversuche mit fluessiger warmer Kartoffelschlempe und mit getrockneter Kartoffelschlempe im Vergleich zum Palmkernkuchen. Landw. Jahrb. 45, 325-437. Steers: molasses; palm kernel oil meal; potato spent residue, dried. Sheep: hay, meadow, Europe; wheat straw; lactic acid; molasses; palm kernel oil meal; potato spent residue, dried.
- — — — — UND E. REISCH, 1926. Ueber die Verluste eines Mais-Erbсен-Gemisches an Rohnaehrstoffen und verdaulichen Naehrstoffen bei der Normalsauerfuetterbereitung. Deut. Landw. Gesell. Mitt. 41, 183-186. Sheep: corn pea mixed silage.
- — — — — UND H. JANTZON, 1924a. Einsaeuerungsversuche aus dem Jahre 1924. Die Verluste an Roh- und verdaulichen Naehrstoffen bei der Normalsauerfuetterbereitung von Futterrueben. Deut. Landw. Gesell. Arb. 327, 36-45. Sheep: mangel silage, roots.
- — — — — 1924b. Untersuchung ueber die Naehrstoffverluste bei der Sauerfuetterbereitung eines Mais-Wicken-Gemisches und eines vor der Bluete gemachten Weissklee im amerikanischen Futterturm und in einer wasserundurchlaessigen Grube. Deut. Landw. Gesell. Mitt. 39, 813-816. Sheep: corn vetch mixed fodder, dehydrated; corn vetch mixed silage.

## VOELTZ, REISCH, UND JANTZON, continued

- 1925. Einsauerungsversuche aus dem Jahre 1923. Die Verluste an verdaulichen Naehrstoffen bei der Normalsauerfutterbereitung von Klee gras und bei Verwertung dieses Sauerfutters in Vergleich mit einem auf Reutern getrockneten Klee gras der gleichen Herkunft durch milchkuehe. Deut. Landw. Gesell. Arb. Heft 331, 15-35. Sheep: clover hay, dehydrated; clover hay, red, 1st cutting, dried on riders; clover silage, red.
- W. KIRSCH, ET AL., 1928. Untersuchungen ueber die chemische Zusammensetzung und den Futterwert einzelner Graeser. II. Mitteilung. Ostpreussen Landw. Kammer Arb. 57, 1-46. Sheep: bluegrass hay; canarygrass hay, red; foxtail, meadow, immature, dried; sedge hay.
- WARTH, F. J., 1928. Bangalore maintenance experiments. India Dept. Agr. Mem. Chem. Ser. (1926-1928) 9, 37-61. Steers: hay, India; rice straw.
- WATERS, H. J., 1915. Studies of the timothy plant. Part 1: The influence of maturity upon the yield, composition, digestibility, palatability, and feeding value of timothy hay. Mo. Agr. Expt. Sta. Res. Bul. 19, 1-24. Steers: timothy hay.
- WATKINS, W. E., 1929. The digestibility of cotton seed meal as a supplemental feed for range cattle in New Mexico. N. Mex. Agr. Expt. Sta. Bul. 178, 5-42. Steers: wheat straw.
- 1931. The digestibility of cottonseed meal as a supplemental feed for range cattle in New Mexico. II. With low protein intake. N. Mex. Agr. Expt. Sta. Bul. 194, 5-50. Steers: wheat straw.
- 1933. Digestion and mineral balance trials on range cattle with native New Mexico range hay, cottonseed meal, and mineral supplements. N. Mex. Agr. Expt. Sta. Bul. 212, 4-32. Steers: tobosa vine-mesquite mixed hay.
- WATSON, C. J., J. A. CAMPRELL, W. M. DAVIDSON, ET AL., 1939. Digestibility studies with ruminants. VI. Associative digestibility of grains, barley, oats, and oil cake. Sci. Agr. 20, 238-253. Steers: alfalfa timothy mixed hay; barley, grain; linseed oil meal, old process; oats, grain.
- ET AL., 1940. Digestibility studies with ruminants. VII. Plane of nutrition and digestibility on hay—oil cake ration. Sci. Agr. 20, 458-469. Steers: linseed oil meal, old process.
- ET AL., 1941. Digestibility studies with ruminants. VIII. Associative digestibility of hay and grain. Sci. Agr. 22, 250-270. Steers: alfalfa clover timothy mixed hay; barley, grain; barley, grain; linseed oil meal, old process; linseed oil meal, old process; oats, grain; oats, grain.
- ET AL., 1942. Digestibility studies with ruminants. IX. Associative digestibility of grains; wheat bran, gluten feed and soybean oil meal. Sci. Agr. 22, 561-570. Steers: alfalfa clover grass mixed hay; corn gluten feed; soybean oil meal, solvent process; wheat bran.
- ET AL., 1943. Digestibility studies with swine. I. The digestibility of grains and concentrates at different stages of the growing and fattening period. Sci. Agr. 23, 708-724. Swine: barley, grain; corn, grain; oats, grain; wheat flour middlings; wheat standard middlings; wheat, grain.
- W. M. DAVIDSON, J. C. WOODWARD, ET AL., 1939. Digestibility studies with ruminants. V. Associative digestibility among roughage and succulent feeds. Sci. Agr. 20, 175-204. Steers: hay, Eastern Canada; oat hulls; oat hulls; oat straw; oat straw; corn silage; corn silage.
- AND W. GODDEN, 1935. The comparative digestibility of artificially-dried pasture herbage by sheep and rabbits. Empire Jour. Expt. Agr. 3, 346-350. Sheep: clover grass mixed, immature, dried; grass mixed, immature, dehydrated.

WATSON, C. J., continued

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- G. W. MUIR, AND W. M. DAVIDSON, 1934. Studies on vim oat feed. 2. The digestibility of oat hulls. *Sci. Agr.* 14, 633-644. Steers: clover grass mixed hay; oat hulls; *oat hulls*; oat mill feed.
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- 1935. Digestibility studies with ruminants. 1. Plane of nutrition and digestibility of hay. *Sci. Agr.* 15, 476-487. Steers: clover grass mixed hay.
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- AND J. I. DORE, 1933. Studies on vim oat feed. I. The digestibility of vim oat feed. *Sci. Agr.* 13, 382-394. Steers: clover grass mixed hay; oat mill feed; *oat mill feed*.
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- J. C. WOODWARD, W. M. DAVIDSON, ET AL., 1936. Digestibility of Canadian feeding stuff. Soybean oil meal. *Sci. Agr.* 17, 22-30. Steers: clover grass mixed hay; *linseed oil meal, old process*; soybean oil meal, *hydraulic or expeller process*.
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- ET AL., 1938. Digestibility studies with ruminants. III. Plane of nutrition and digestibility of mangels. *Sci. Agr.* 18, 586-605. Steers: hay, Eastern Canada; mangels, roots; *mangels, roots*.
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- ET AL., 1939. Digestibility studies with ruminants. IV. Plane of nutrition and digestibility of corn silage. *Sci. Agr.* 19, 622-651. Steers: alfalfa clover timothy mixed hay; corn silage; *corn silage*.
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- WATSON, S. J., 1931a. The digestibility and feeding value of dreg meal. *Jour. Agr. Sci.* 21, 410-413. Sheep: grass mixed hay, dehydrated; *dreg meal*.
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- 1931b. IV. The digestibility and feeding value of artificially dried grass. *Jour. Agr. Sci.* 21, 414-424. Sheep: grass mixed hay, dehydrated.
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- 1931c. V. The digestibility and feeding value of grass silage made in a tower, and the digestibility and comparative yield of artificially dried grass obtained from the same source. *Jour. Agr. Sci.* 21, 425-441. Sheep: grass mixed hay, dehydrated; grass silage, British Isles.
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- 1931d. VI. The digestibility and feeding value of grass silage made in a stack. *Jour. Agr. Sci.* 21, 453-457. Sheep: grass silage, British Isles.
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- 1931e. VII. The digestibility and feeding value of grass silage made in a pit. *Jour. Agr. Sci.* 21, 469-475. Sheep: grass silage, British Isles.
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- 1934. Grass conservation and its relation to grassland management and animal nutrition. 3d Grassland Conference of the N. Central European Countries in Switz. 383-398. Sheep: grass mixed hay, dehydrated; grass mixed, fed green, British Isles; grass silage, A. I. V.; grass silage, molasses added; grass silage, lactic acid bacteria and dried whey added.
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- 1940. Marrow-stem kale, its manuring and feeding value. *Imp. Chem. Ind. Ltd. (Jealott's Hill) Rpt. ARA 580, 1-31*. Sheep: *kale, marrow, fed green*.
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- AND W. S. FERGUSON, 1932a. Investigations into the intensive system of grassland management: VIII. The comparative digestibility and feeding value of fresh and artificially dried grass. *Jour. Agr. Sci.* 22, 235-246. Sheep: grass mixed, immature, dehydrated; grass mixed pasture, British Isles.
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- 1932b. IX. The digestibility of artificially dried hay. *Jour. Agr. Sci.* 22, 247-250. Sheep: clover ryegrass mixed hay.

WATSON, S. J., AND FERGUSON, continued

- 1934a. The ordinary processes of silage-making, and the use of sugar and common salt in conjunction with these processes. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 382, 1-53. Sheep: grass mixed, fed green, British Isles; bean oat pea vetch mixed silage, mature, molasses added; clover, red, ryegrass timothy mixed silage; grass silage, British Isles; grass silage, pit and stack, British Isles; grass silage, molasses added; grass silage, salt added.
- 1934b. The use of whey in silage making. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 385, 1-28. Sheep: grass mixed, fed green, British Isles; grass silage, lactic acid bacteria and dried whey added.
- 1936a. Experiments with various types of silage and acid-fodder in 1933. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 386, 1-27. Sheep: grass mixed, fed green, British Isles; grass silage, British Isles; grass silage, A. I. V.; grass silage, A. I. V. acid and sugar added; *grass silage, molasses and acid added*.
- 1936b. Comparison of cold-fermentation process silage, molasses silage, whey silage, defu fodder and A. I. V. fodder. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 387, 1-55. Sheep: grass mixed, fed green, British Isles; grass silage, British Isles; grass silage, A. I. V.; *grass silage, molasses and acid added*; grass silage, molasses added.
- 1936c. The value of artificially dried grass silage made with added molasses and A. I. V. fodder in the diet of the dairy cow and their effect on the quality of the milk, with special reference to the value of the non-protein nitrogen. Jour. Agr. Sci. 26, 337-367. Sheep: grass mixed hay, dehydrated; grass silage, A. I. V.; grass silage, molasses added.
- 1937a. The chemical composition of grass silage. Jour. Agr. Sci. 27, 1-42. Sheep: grass silage, British Isles; grass silage, stack, British Isles.
- 1937b. The nutritive value of meadow hay. Jour. Min. Agr. 44, 247-260. Sheep: clover ryegrass mixed hay; fescue grass mixed hay; fescue orchardgrass mixed hay; hay, British Isles; orchardgrass ryegrass mixed hay; timothy hay.
- AND G. BISHOP, 1934. The nutritive value of silage A. I. V. fodder and artificially dried grass. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 384, 1-45. Sheep: alfalfa hay; clover hay; grass mixed hay, dehydrated.
- AND E. A. HORTON, 1937. The time of cutting hay, and the losses entailed during hay making. Jour. Agr. Sci. 27, 224-258. Sheep: clover, red, ryegrass mixed hay; hay, British Isles; hay, 2d cutting, British Isles; clover, red, grass mixed fodder, fed green; grass mixed, fed green, British Isles.
- AND H. J. PAGE, 1934. The A. I. V. process and the use of acids generally in the conservation of forage crops. Imp. Chem. Ind. Ltd. Agr. Res. Sta. (Jealott's Hill) Rpt. ARA 383, 1-82. Sheep: beet tops, sugar, fed green; grass mixed, fed green, British Isles; kale, marrow, fed green; orchardgrass ryegrass mixed fodder, fed green; beet top silage, sugar, A. I. V.; grass silage, British Isles; *grass silage, molasses and acid added*; kale silage, marrow, A. I. V. acid added; orchardgrass ryegrass mixed silage.
- WEINIGER, E., 1910. Untersuchungen ueber die Verdaulichkeit des Palmkernkuchenmehls und des entfetteten Palmkernmehls. Landw. Vers. Sta. 72, 143-150. Sheep: hay, meadow, Europe; *palm kernel oil meal*.
- WEISER, I., AND I. KELP, 1923. Composition and nutritive value of Hungarian alfalfa hay. Kiserlet. Közlem. 26, 20-30. Sheep: alfalfa hay; alfalfa meal, poor quality.



- WEISER, S., 1906. Ueber den Naehrwert getrockneter Weintrester. Beitrage zur Futtermittellehre und Stoffwechselphysiologie der Landw. Nutztiere. Heft 1, 66-80. Steers: *grape marc meal, molasses added*. Horses: hay, meadow, Europe; *grape marc meal, molasses added*.
- UND A. ZAITSCHEK, 1913. Ueber den Einfluss der Saatweite auf den Ertrag und Naehrwert des Futtermais. Landw. Vers. Sta. 81, 49-100. Steers: corn fodder, dehydrated; corn silage. Sheep: corn fodder, dehydrated; corn silage.
- 1920. Ueber Strohaufschliessung. Landw. Vers. Sta. 97, 57-110. Sheep: hay, meadow, Europe; *wheat straw, winter; wheat straw, winter, treated with NaOH, dry; wheat straw, winter, steamed*. Horses: *wheat straw, winter; wheat straw, winter, treated with NaOH, dry; wheat straw, winter, steamed*.
- 1932. Ueber Zusammensetzung und Verdaulichkeit von Futterrueben. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 4, 201-214. Steers: hay, meadow, Europe; oat hay; *beets, sugar, roots; mangels, roots*.
- WEISKE, H., 1892. Ueber die Verdaulichkeit des Futters (Heu, Hafer) unter verschiedenen Umstaenden und bei verschiedenen Tieren. Landw. Jahrb. 21, 5, 791-807. Sheep: oats, grain.
- 1894. Versuche ueber die Verdaulichkeit und den Naehrwert verschiedener Cerealienkoerner. Landw. Vers. Sta. 43, 207-222. Sheep: oats, grain.
- B. DEHMEL, G. KENNEPOHL, ET AL., 1885. Versuche ueber etwaige Einfluesse, welche die Aufnahme freier Saeure auf die Verdauungsvorgaenge sowie auf den Stickstoff- und Mineralstoff- Umsatz im Koerper der Herbivoren ausuebt. Jour. f. Landw. 33, 21-76. Sheep: hay, meadow, Europe.
- UND B. SCHULZE, 1879. Futterausnutzungsversuche mit Sojabohnen-Stroh und Schalen, ausgefuehrt auf der Versuchs-Station Proskau. Jour. f. Landw. 27, 511-520. Sheep: soybean pods, dry; soybean straw.
- UND G. FLECHSIG, 1886. Versuche ueber die Wirkung von Alkoholaufnahme bei Herbivoren. Jour. f. Landw. 34, 153-166. Sheep: hay, meadow, Europe.
- G. KENNEPOHL, UND B. SCHULZE, 1879. Versuche ueber die Verdaulichkeit und den Naehrwert des beim Brauen ausgekochten Hopfens. Jour. f. Landw. 27, 261-274. Sheep: hay, meadow, Europe; *hops, dried spent*.
- 1882. Ueber die Zusammensetzung und die Verdaulichkeit der Serradella in verschiedenen Altersstadien. Jour. f. Landw. 30, 391-400. Sheep: *serradella hay*.
- 1883. Ueber die Verdaulichkeit verschiedener Leguminosenstropharten. Jour. f. Landw. 31, 209-219. Sheep: bean straw, kidney; horsebean straw; soybean straw.
- M. SCHRODT, UND M. C. de LEEUW, 1879. Versuche ueber Verdaulichkeit und Naehreffect des Johannisbrotes. Jour. f. Landw. 27, 321-348. Sheep: hay, meadow, Europe; *carob seed*.
- B. SCHULZE, UND G. FLECHSIG, 1885. Versuche ueber die Verdaulichkeit und den Naehrwert von Baumwollensamen-Kuchen und Mehl. Jour. f. Landw. 33, 235-250. Sheep: hay, meadow, Europe; *cottonseed feed*.
- E. WILDT, R. POTTS, ET AL., 1877. Untersuchungen ueber die Zusammensetzung und Ausnutzung der nach verschiedenen Erntemethoden gewonnenen Esparsette. Jour. f. Landw. 25, 170-222. Sheep: sainfoin hay, common; sainfoin hay, brown; sainfoin fodder, common, fed green; sainfoin silage, common.
- WELLMANN, O., 1914. Fuetterungsversuche an Kaelbern und Ferkeln mit Vollmilch und korrigierter Magermilch. Landw. Jahrb. 46, 499-626. Swine: milk, cow's; milk, skimmed, reinforced; milk, skimmed, fat added and emulsified.

WELLMANN, continued

— 1918. Fuetterungsversuche an Ferkeln mit fett- und kohlehydratreicher Milch von verschiedenem Eiweissgehalt. Landw. Jahrb. 52, 671-740. Swine: milk, skimmed, reinforced; milk, skimmed, fat added and emulsified.

WICKE, A., UND H. WEISKE, 1896a. Versuche ueber die Verdaulichkeit und den Naehrwert der Kuerbiskernkuchen und Buchweizenkoerner. Landw. Vers. Sta. 46, 371-382. Sheep: hay, meadow, Europe; *buckwheat, seed; pumpkin seed meal.*

— 1896b. Ueber den Einfluss einer Fett-resp. Staerkebeigabe auf die Ausnuetzung der Naehrstoffe im Futter und auf den N- Umsatz und Ansatz im Thier-Koerper. Ztschr. f. Physiol. Chem. 22, 137-152. Sheep: oil; starch.

WIDSTOE, J. A., 1898. Digestion experiments. (With shredded corn fodder, lucern, timothy and wheat bran). Utah Agr. Expt. Sta. Bul. 54, 141-151. Steers: alfalfa hay; timothy hay; corn fodder, dry; *wheat bran.*

— AND J. STEWART, 1898. The chemical life history of lucern. Utah Agr. Expt. Sta. Bul. 58, 55-90. Steers: alfalfa hay, 1st cutting; alfalfa hay, 2d cutting; alfalfa hay, 3d cutting.

WIEGNER, G., 1925. Konservierungsversuche mit Duerrfutter sog. Suessgruenfutter und Elektrofutter in der Schweiz. Deut. Landw. Gesell. Arb. Heft 331, 54-79. Sheep: alfalfa grass mixed hay; alfalfa grass mixed fodder, fed green; alfalfa grass mixed silage.

— E. CRASEMANN, UND J. MAGASANIC, 1923. Untersuchungen ueber Futterkonservierung. I. Das sogenannte Suessgruenfutter. Landw. Vers. Sta. 100, 143-268. Sheep: hay, meadow, sewage-irrigated, Europe; grass silage, Europe.

WILDT, E., 1877a. Ueber die Verwendbarkeit animalischer Proteinsubstanzen als Futtermittel fuer Herbivoren. Landw. Vers. Sta. 20, 21-33. Sheep: *blood meal; tankage.*

— 1877b. Fuetterungsversuche mit Schafen zur Feststellung des Gehaltes an verdaulichen Naehrstoffen im Kartoffelkraut, Pappellaub und in eingesaeuerten Ruebenblaettern. Landw. Jahrb. 6, 133-155. Sheep: hay, meadow, Europe; barley straw; *leaves and twigs, poplar, dried; potato tops, dry; beet top silage, sugar.*

— 1877c. Ueber die Verdaulichkeit des Blutmehls und ueber den relativen Naehreffekt animalischer und vegetabilischer Proteinsubstanzen. Landw. Jahrb. 6, 177-191. Swine: potatoes, cooked; *blood meal; peas, seed, cooked.*

WILLARD, J. T., AND R. W. CLOTHIER, 1901. Digestion experiments with Kansas feeds. Kans. Agr. Expt. Sta. Bul. 103, 253-275; 1902, Kans. Acad. Sci. Trans. 18, 59-60. Steers: alfalfa hay; buffalograss, immature, dried; hay, prairie, Kansas; sorghum stover, kafir, dry; *sorghum grain, kafir; soybeans, seed.*

WINKLER, G., 1941. Zur Verdaulichkeit von Luzerneheu bei Fuetterung an landwirtschaftliche Arbeitspferde. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 13, 124-132. Horses: alfalfa hay.

WITHYCOMBE, J., AND C. E. BRADLEY, 1908. Digestibility of kale, vetch hay, steamed and unsteamed silage. Ore. Agr. Expt. Sta. Bul. 102, 3-29. Cows: vetch hay, common; kale, fed green; corn silage; corn silage, steamed; vetch silage, steamed.

— AND A. L. KNISELY, 1905. Digestibility of vetch hay and corn silage. Ore. Agr. Expt. Sta. Bul. 85, 5-13. Cows: vetch hay, common; corn silage.



- WOEHLBIER, W., UND W. SCHRAMM, 1934. Der Futterwert von Markstammkohl. Biedermann's Zentbl. f. Agr. Chem. Abt. B, Tierernaehrung 6, 1-13. **Sheep:** clover hay; *cabbage leaves, fed green; kale, marrow, fed green; kale leaves, marrow, fed green; kale stems, fed green.*
- 1936a. Stoffwechselversuche mit Rapskuchenschrot. Landw. Vers. Sta. 124, 246-250. **Sheep:** hay, meadow, Europe; *rape seed oil meal.*
- 1936b. Die Verdaulichkeit von Holzzucker. Landw. Vers. Sta. 126, 19-27. **Sheep:** *sugar, wood.* **Swine:** *sugar, wood.*
- 1936c. Der Naehrwert von Walmehl. Zuechtungskunde 11, 401-408. **Sheep:** hay, meadow, Europe; *whale meal.* **Swine:** barley, grain; *whale meal.*
- UND G. HEROLD, 1936. Der Futterwert der Futtermalve. Landw. Jahrb. 83, 555-584. **Sheep:** hay, meadow, Europe; *mallow hay; mallow hay, curly; mallow hay, smooth; mallow straw.*
- UND C. WINDHEUSER, 1937. Die Verdaulichkeit von Amidschnitzeln. Landw. Vers. Sta. 128, 205-210. **Sheep:** *beet pulp, urea added, dried.*
- 1939. Die Verdaulichkeit von Blasentang (*Fucus vesiculosus*). Ztschr. f. Tierernaehr. u. Futtermittelk. 2, 110-115. **Sheep:** *rockweed, dry.*
- WOLBERG, F. B., R. E. HODGSON, J. C. KNOTT, AND U. S. ASHWORTH, 1940. The digestibility of corn silage and mixed hay as determined by dairy cattle and sheep. Western Div. Amer. Dairy Sci. Assoc. Proc. 26th Ann. Meeting, 72-74. **Cows:** hay, Washington; corn silage. **Sheep:** hay, western mixed, Washington; corn silage.
- WOLFF, E., UND J. EISENLOHR, 1892. Wiesengras und Pressfutter. Landw. Jahrb. 21, 45-77. **Sheep:** hay, meadow, Europe; hay, meadow, 2d cutting, Europe; grass silage, Europe; *grass silage, Europe.*
- 1893. Versuche ueber die Verdauung des Futters unter dem Einfluss einer Beigabe von Kochsalz. Landw. Jahrb. 22, 605-627. **Sheep:** hay, meadow, Europe; *beans, seed; brewers' dried grains.*
- W. FUNKE, UND G. DITTMANN, 1876. Versuche ueber das Verdauungsvermoegen der Schweine fuer verschiedenen Futtermittel und Futtermischungen. Landw. Vers. Sta. 19, 241-313. **Swine:** barley, grain; *barley, grain; cockchafers, dried; coconut oil meal; corn, grain; peas, seed.*
- 1879. Fuetterungsversuche mit Schweinen. Ueber die Verdaulichkeit und die Naehrwirkung der Kartoffeln und des Fleischmehles. Landw. Jahrb. 8, Supp. 1, 200-222. **Swine:** potatoes, cooked; *tankage.*
- M. FLEISCHER, UND I. SKALWEIT, 1873. Versuche ueber das Verdauungsvermoegen von zweierlei Schafrassen in verschiedenen Wachstumsperioden und bei verschiedener Fuetterungsweise. Landw. Jahrb. 2, 221-308. **Sheep:** hay, meadow, Europe; hay, meadow, 2d cutting, Europe; *oats, grain.*
- UND O. KELLNER, 1884. Pferde-Fuetterungsversuche. Versuche mit Pferden ueber die Verdaulichkeit von Kartoffeln und Moehren neben Heu und Hafer. Landw. Jahrb. 13, 245-256. **Horses:** hay, meadow, Europe; *carrots, roots; potatoes, tubers; oats, grain.*
- UND C. KREUZHAGE, 1872. Versuche ueber das Verdauungsvermoegen verschiedener Schafrassen fuer Erhaltungsfutter und fuer Mastfutter. Landw. Jahrb. 1, 533-571. **Sheep:** clover hay, red; *potatoes, tubers; linseed oil meal, old process.*
- 1876. Versuche ueber den Einfluss steigender Fettmengen auf die Verdauung des Futters. Landw. Jahrb. 5, 513-556. **Sheep:** hay, meadow, Europe; *beans, seed; palm kernel oil meal.*

WOLFF, FUNKE, UND KREUZHAGE, continued

1879a. Fuetterungsversuche mit Hammeln. Ueber die Verdaulichkeit der Rueben und Kartoffeln und ueber den Einfluss von deren Beifuetterung auf die Verdauung des Rauhfutters. Landw. Jahrb. 8, Supp. 1, 123-184. Sheep: hay, meadow, Europe; hay, meadow, 2d cutting, Europe; vetch hay, common.

1879b. Fuetterungsversuche mit Hammeln. Ueber die Verdaulichkeit von Baumwollsaamenkuchen und von Leinkuchen. Landw. Jahrb. 8, Supp. 1, 185-192. Sheep: clover hay, red; *cottonseed feed*; *linseed oil meal*, *old process*.

1879c. Fuetterungsversuche mit Hammeln. Ueber die Verdaulichkeit von Haferstroh, Wiesenheu und Erbsenstroh. Landw. Jahrb. 8, Supp. 1, 193-199. Sheep: hay, meadow, Europe; oat straw; pea hay.

1881. Pferde-Fuetterungsversuche. Landw. Jahrb. 10, 594-601. Sheep: hay, meadow, Europe; *peas, seed*. Horses: hay, meadow, Europe; *peas, seed*.

1882. Ueber die Verdaulichkeit einiger Arten von auslaendischen Oelkuchen. Landw. Vers. Sta. 27, 215-245. Sheep: hay, meadow, 2d cutting, Europe; *coconut oil meal*; *cottonseed meal*; *peanut oil meal*; *sesame oil meal*; *sunflower seed oil meal*, *hulls removed*.

UND O. KELLNER, 1877. Pferde-Fuetterungsversuche. Landw. Vers. Sta. 20, 125-169. Sheep: hay, meadow, Europe; *oats, grain*. Horses: hay, meadow, Europe; *wheat straw, winter*; *oats, grain*.

1878. Pferde-Fuetterungsversuche. Landw. Vers. Sta. 21, 19-61. Sheep: alfalfa hay, 2d cutting; alfalfa hay, 3d cutting; hay, meadow, Europe. Horses: alfalfa hay, 2d cutting; alfalfa hay, 3d cutting; hay, meadow, Europe.

1879a. Pferde-Fuetterungsversuche. Wiederholte Versuche ueber die Verdaulichkeit des normalen Pferdefutters von Wiesenheu, Hafer und Strohhaecksel. Landw. Jahrb. 8, Supp. 1, 6-33. Sheep: wheat straw; *oats, grain*. Horses: hay, meadow, Europe; *wheat straw*; *oats, grain*.

1879b. Pferde-Fuetterungsversuche. Ueber die Verdauung des in verschiedenen Vegetationsstadien geschnittenen Wiesenfutters durch Pferd und Hammel, nebst Beobachtungen ueber den Eiweissumsatz im Koerper der beiderlei Thiergattungen. Landw. Jahrb. 8, Supp. 1, 34-72. Sheep: grass, immature, dried, Europe; grass, immature, air dried, Europe; hay, meadow, Europe; hay, air dried, Europe. Horses: grass, immature, air dried, Europe; hay, meadow, Europe; hay, air dried, Europe.

1879c. Pferde-Fuetterungsversuche. Die Verdauung des Futters unter dem Einfluss einer gesteigerten Arbeitsleistung des Pferdes, nebst Beobachtungen ueber das zur Aufbesserung des Ernaehrungszustandes erforderliche Futter. Landw. Jahrb. 8, Supp. 1, 73-122. Sheep: hay, meadow, Europe; *beans, seed*; *corn, grain*. Horses: hay, meadow, Europe; *beans, seed*; *corn, grain*.

1881a. Pferde-Fuetterungsversuche. Vergleichende Versuche mit Pferd und Hammel ueber die Verdauung von zweierlei Arten Kleeheu. Landw. Jahrb. 10, 559-584. Sheep: hay, meadow, Europe. Horses: hay, meadow, Europe; *barley, grain*; *oats, grain*.

## WOLFF, FUNKE, KREUZHAGE, UND KELLNER, continued

- 1881b. Pferde-Fuetterungsversuche. Die Verdauung des Futters unter dem Einfluss ungleicher Arbeitsleistung des Pferdes, mit Beigabe von Staerkemehl und mit einseitig erhoehter Menge des Futterfettes. Landw. Jahrb. 10, 585-593. **Sheep:** alfalfa hay; clover hay; clover hay, red; hay, meadow, Europe. **Horses:** alfalfa hay; clover hay; clover hay, red; hay, meadow, Europe.
- UND C. KREUZHAGE, 1895. Pferde-Fuetterungsversuche ueber Verdauung und Arbeits-Aequivalent des Futters. Landw. Jahrb. 24, 125-271. **Horses:** hay, meadow, Europe; oat straw; oats, grain.
- UND J. MAYER, 1896. Fuetterungsversuche mit Hammeln. Landw. Jahrb. 25, 175-193. **Sheep:** hay, meadow, Europe; barley, grain; beans, seed.
- H. SIEGLIN, C. KREUZHAGE, UND T. MEHLIS, 1887. Pferde-Fuetterungsversuche. Versuche ueber die Leistungsfahigkeit des Pferdes bei stickstoffreicherem und stickstoffarmerem Futter, sowie ueber den Kreislauf der Mineralstoffe im Koerper dieses Thieres. Landw. Jahrb. 16, Supp. 3, 1-48. **Horses:** hay, meadow, Europe; spelt straw; oats, grain.
- ET AL., 1890. Fuetterungsversuche mit Hammeln. Landw. Jahrb. 19, 797-854. **Sheep:** hay, meadow, Europe; beans, seed; brewers' dried grains; corn, grain; flaxseed; lupine seed, bitterness extracted; malt sprouts; oats, grain; sorghum grain, durra.
- UND C. RIESS, 1887. Pferde-Fuetterungsversuche. Versuche ueber den Einfluss einer verschiedenen Art der Arbeitsleistung auf die Verdauung des Futters, sowie ueber das Verhalten des Rauhfutters gegenueber dem Kraftfutter zur Leistungsfahigkeit des Pferdes. Landw. Jahrb. 16, Supp. 3, 49-131. **Horses:** hay, meadow, Europe; corn, grain; oats, grain.
- O. VOSSLER, C. KREUZHAGE, UND O. KELLNER, 1884. Pferde-Fuetterungsversuche. Vergleichende Versuche mit Pferd und Hammel ueber die Verdaulichkeit von Luzerne und Kleeheu. Landw. Jahrb. 13, 257-270. **Sheep:** alfalfa hay; clover hay. **Horses:** alfalfa hay; clover hay.
- UND T. MEHLIS, 1884. Vergleichende Versuche mit Pferd und Hammel ueber die Verdaulichkeit von Wiesenheu und Kleeheu, nebst Betrachtungen ueber die Ausscheidung der Mineralstoffe bei Pferden. Landw. Jahrb. 13, 271-290. **Sheep:** clover hay; hay, meadow, Europe. **Horses:** clover hay; hay, meadow, Europe.
- WOLL, F. W. A., 1889. Digestion experiments with silage and fodder corn. Wis. Agr. Expt. Sta. 6th Ann. Rpt., 69-122. **Cows:** corn fodder, dry; corn silage.
- WOOD, T. B., AND H. E. WOODMAN, 1921. The digestibility of oat and tare silage. Jour. Agr. Sci. 11, 304-309. **Sheep:** oat vetch mixed silage.
1924. Digestion trials with swine. I. Description of harness and metabolism crate. II. Digestibility of barley meal. Jour. Agr. Sci. 14, 489-505. **Swine:** barley, grain.
- WOODMAN, H. E., 1922. Comparative determinations of the digestibility and metabolizable energy of green oats and tare, oats and tare hay, and oat and tare silage. Jour. Agr. Sci. 12, 144-165. **Sheep:** oat vetch mixed hay; oat vetch mixed fodder, fed green; oat vetch mixed silage.
1923. Wheat offals: Their grading, composition and digestibility. Jour. Agr. Sci. 13, 483-507. **Sheep:** wheat bran.
- 1925a. Digestion trials with swine. II. Comparative determinations of the digestibility of dry-fed maize, cooked maize, soaked maize and flaked maize. Jour. Agr. Sci. 15, 1-25. **Swine:** corn, grain; corn, cooked; corn flakes; wheat standard middlings.



WOODMAN, continued

- 1925b. The nutritive value of stack silage. Jour. Agr. Sci. 15, 327-333. Sheep: clover ryegrass mixed silage, stack.
- AND A. AMOS, 1926. The ensilage of sugar beet tops. Jour. Agr. Res. 16, 406-415. Sheep: beet pulp and top silage.
- 1928. Maize silage. II. Jour. Agr. Sci. 18, 194-199. Sheep: corn silage.
- AND J. W. BEE, 1927. The nutritive and manurial values of sugar beet tops. Jour. Agr. Sci. 17, 477-488. Sheep: hay, British Isles; beet crowns and tops, sugar, fed green.
- AND G. GRIFFITH, 1930. Nutritive value of pasture. V. Pasture grass conservation: The influence of artificial drying on the digestibility of pasture herbage. Jour. Agr. Sci. 20, 53-62. Sheep: grass mixed, immature, dehydrated.
- D. L. BLUNT, AND J. STEWART, 1926. Nutritive value of pasture: I. Seasonal variations in the productivity, botanical and chemical composition and nutritive value of medium pasturage on a light sandy soil. Jour. Agr. Sci. 16, 205-274. Sheep: clover grass mixed pasture.
- 1927. Nutritive value of pasturage. II. Seasonal variations in the productivity, botanical and chemical composition and nutritive value of pasturage on a heavy clay soil. Jour. Agr. Sci. 17, 209-263. Sheep: grass mixed pasture, British Isles.
- AND W. E. CALTON, 1928. The composition and nutritive value of sugar beet pulp. Jour. Agr. Sci. 18, 544-568. Sheep: ryegrass sainfoin mixed hay; beet pulp, dried; beet pulp, wet.
- A. N. DUCKHAM, AND M. H. FRENCH, 1929a. The value of dried sugar beet pulp and molasses-sugar beet pulp in the nutrition of swine. Jour. Agr. Sci. 19, 656-668. Swine: beet pulp, dried; beet pulp, molasses added, dried.
- 1929b. The value of whole sugar beets in the nutrition of swine. Jour. Agr. Sci. 19, 669-676. Swine: beets, sugar, roots.
- AND A. EDEN, 1934. Nutritive value of lucerne: III. The composition, digestibility, and nutritive value of lucerne hay, lucerne meal and lucerne leaf meal. (American). Jour. Agr. Sci. 25, 50-70. Sheep: alfalfa meal; alfalfa hay, dehydrated; alfalfa hay, 1st cutting; alfalfa, 1st cutting, immature, dried; alfalfa hay, 2d cutting; alfalfa leaf meal.
- AND R. E. EVANS, 1930. Nutritive value of pasture: VI. The utilization by sheep of mineral-deficient herbage. Jour. Agr. Sci. 20, 587-617. Sheep: moorgrass grass mixed hay.
- 1932. The value of degermed maize meal (cooked) in the nutrition of swine. Jour. Agr. Sci. 22, 670-675. Swine: corn, degermed, cooked.
- 1936. The composition and nutritive value of marrow stem kale and thousand head kale. Jour. Agr. Sci. 26, 212-238. Sheep: grass, immature dried, British Isles; kale, thousand head, fed green; kale, marrow, fed green; kale, marrow, fed green.
- 1937. The composition and digestibility, when fed to pigs, of three grades of meat meal of widely differing fat content. Jour. Agr. Sci. 27, 465-473. Swine: tankage.

## WOODMAN and EVANS, continued

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- 1939. The composition and digestibility, when fed to pigs and sheep of potato cossettes and potato meal. Jour. Agr. Sci. 29, 347-361. Sheep: hay British Isles; *potato flakes*; *potato flour*. Swine: *potato flakes*; *potato flour*.
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- 1940. The composition and nutritive value when fed to ruminants of pea pod meal and broadbean pod meal. Jour. Agr. Sci. 30, 189-201. Sheep: *broadbean pod meal*; *pea hulls or pods, dry*.
- 
- 1942. The nutrition of the bacon pig. VII. The chemical and nutritive value of different types of swill. Jour. Agr. Sci. 32, 85-107. Swine: *garbage, dried*; wheat standard middlings.
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- 1943a. Further investigation of the feeding value of artificially dried potatoes. The composition and nutritive value of potato cossettes, potato meal, potato flakes, potato slices and potato dust. Jour. Agr. Sci. 33, 1-14. Sheep: *potato flakes*; *potato flour*. Swine: *potato flakes*; *potato flour*.
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- 1943b. The value of potato peelings in nutrition of bacon pigs. Jour. Agr. Sci. 33, 15-17. Swine: *potato peelings*; wheat standard middlings.
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- AND A. W. MENZIES KITCHIN, 1932. The value of oats in the nutrition of swine. Jour. Agr. Sci. 22, 657-669. Swine: *oats, grain*.
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- AND D. B. NORMAN, 1933. Nutritive value of lucerne (alfalfa). Jour. Agr. Sci. 23, 419-458. Sheep: *alfalfa, fed green*.
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- 1934. Nutritive value of lucerne: II. Investigations into the influence of systematic cutting at three different stages of growth on the yield, composition, and nutritive value of lucerne. Jour. Agr. Sci. 24, 283-311. Sheep: *alfalfa, very immature, fed green*; *alfalfa, 1st cutting, fed green*; *alfalfa, 2nd cutting, fed green*; *alfalfa, 3d cutting, fed green*.
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- A. W. MENZIES KITCHIN, AND R. E. EVANS, 1931. The value of tapioca flour and sago pith meal in the nutrition of swine. Jour. Agr. Sci. 21, 526-546. Swine: *sagopalp pith meal, smooth*; *tapioca flour*.
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- AND D. B. NORMAN, 1932. Nutritive value of pasture: IX. The influence of the intensity of grazing on the yield, composition and nutritive value of pasture herbage. Jour. Agr. Sci. 22, 852-873. Sheep: *clover grass mixed fodder, fed green*.
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- 1934. Nutritive value of pasture: X. The influence of utilization of young grass by swine. Jour. Agr. Sci. 24, 93-104. Swine: *grass mixed pasture, British Isles*.
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- AND J. W. BEE, 1928. Nutritive value of pasture. III. The influence of the intensity of grazing on the composition and nutritive value of pasture herbage. Jour. Agr. Sci. 18, 267-296. Sheep: *grass mixed, fed green, British Isles*.
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- 1929. Nutritive value of pasture: IV. The influence of the intensity of grazing on the yield, composition, and nutritive value of pasture herbage. Jour. Agr. Sci. 19, 236-265. Sheep: *grass mixed pasture, British Isles*.
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- AND M. H. FRENCH, 1931. Nutritive value of pasture: VII. The influence of the intensity of grazing on the yield, composition and nutritive value of pasture herbage. Jour. Agr. Sci. 21, 267-323. Sheep: *grass mixed pasture, British Isles*.
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- AND P. M. OOSTHUIZEN, 1934. Nutritive value of pasture: XI. Composition and nutritive value of winter pasturage. Jour. Agr. Sci. 24, 574-597. Sheep: *grass mixed, fed green, British Isles*.

- WOODWARD, J. C., W. M. DAVIDSON, C. J. WATSON, ET AL., 1938. The digestibility of Canadian feeding stuffs: IV. Raw potatoes, dried potatoes, and soaked dried potatoes. *Sci. Agr.* 18, 629-640. Steers: grass legume mixed hay; *potatoes, tubers; potato flour*.
- WOODWARD, T. E., W. F. TURNER, AND D. GRIFFITHS, 1915. Pricklypears as a feed for dairy cows. *Jour. Agr. Res.* 4, 405-450. Cows: cactus, pricklypear, dried; cactus, pricklypear, fed green.
- WORK, S. H., 1937. Digestibility (and composition) of Hawaiian feed stuffs. Hawaii Agr. Expt. Sta. Ann. Rpt., 77-80. Steers: sugarcane bagasse, sifted; alfalfa, fed green; leadtrees fodder, whitepopinac, fed green; napiergrass, fed green; Paragrass, fed green; pigeonpea fodder, fed green; Rhodesgrass, fed green; *mesquite bean, common*.
- 1938. Digestibility of local feeding stuffs. Hawaii Agr. Expt. Sta. Ann. Rpt., 65-74. Steers: bundleflower, rayado, stems leaves pods, fed green; dayflower fodder, fed green; napiergrass, fed green; sugarcane tops, fed green; *fish meal, tuna; pineapple pulp, dried*.
- ZAITSCHKE, A., 1906. VI. Mitteilung. Ueber die Zusammensetzung und den Naehrwert des Kuerbis. Beitrage zur Futtermittellehre und Stoffwechselsphysiologie der Landw. Nutztiere, Heft 1, 87-100; 1906, Landw. Jahrb. 35, 245-258. Steers: *pumpkins, entire*. Swine: pumpkins, entire.
- 1908. Ueber das Blutmehl. Landw. Jahrb. 37, 172-180. Swine: *blood meal; corn, grain*.
- 1912. Untersuchungen ueber die Veraenderungen des Naehrwerths des Futters beim Einsaeuern und ueber die dabei auftretenden Verluste an Naehrstoffen. IV. Mitteilung: Versuche mit Futterrueben. Landw. Vers. Sta. 78, 401-408. Swine: mangels, roots; mangel silage, roots.
- 1929. Ueber den Futterwert des eingesaeuerten Schilfrohrs. Fortschr. der Landw. 4, 392-394. Sheep: *reed silage*.
- ZIELSTORFF, W., 1917. Ueber die Verdaulichkeit des Gruenfutterkuchens nach Oberjaeger Mueller. Deut. Landw. Presse 44, 394. Sheep: hay, meadow, Europe.
- H. HILDEBRANDT, UND A. KELLER, 1927. Vergleichende Untersuchungen zwischen der Elektrofutter-Konservierung und der Normalsauerfutterbereitung nach Voeltz. Die Futterkonservierung 1, Heft 2, 69-126. Sheep: clover hay, red; clover silage.
- UND A. KELLER, 1929a. Vergleichende Untersuchungen zwischen der Silofutterbereitung und der Heuwerbung mittels verschiedener Reitersysteme. Die Futterkonservierung 1, Heft 6, 3-13. Sheep: clover, red, timothy mixed hay; clover, red, timothy mixed hay, dried on riders; clover, red, timothy mixed silage, 1st cutting.
- 1929b. Einsaeuerungsversuche in Lindenberg im Sommer, 1926. Die Futterkonservierung 1, 3-35. Sheep: oat pea mixed hay; oat pea mixed silage.
- 1929c. Einsaeuerungsversuche mit in verschiedenen Vegetationsstadien gemaehetem Rotklee. Die Futterkonservierung 1, Heft 4, 63-84. Sheep: clover, red, timothy mixed hay, 2d cutting; clover silage, red.

## ZIELSTORFF, continued

— UND K. NEHRING, 1929a. Die Heuwerbung mittelst verschiedener Reiter. Die Futterkonservierung 1, Heft 4, 26-52. Sheep: clover hay, air dried; clover hay, dried on riders; clover hay, weathered; clover hay, 2d cutting; clover hay, 2d cutting, air dried; clover hay, dried on riders; clover timothy mixed hay.

— ——— 1929b. Die Heuwerbung auf Schwedenreitern. Landw. Vers. Sta. 109, 253-266. Sheep: clover, red, timothy mixed hay; clover, red, timothy mixed hay, dried on riders.

## SECTION II

### FEED BIBLIOGRAPHY OF RESEARCHES ON THE DIGESTIBILITY AND COMPOSITION OF FEEDING STUFFS

#### *Acacia pods, dry*

French (1932): sheep, steers. (1934): sheep.

#### *Acacia twigs. See Twigs, acacia, dry.*

#### *Acorns, live and post oak, whole*

Fraps (1919): sheep.

#### *Alfalfa hay*

Armsby and Fries (1915), (1918): steers.

Axtmayer, Hernandez, and Cook (1940): sheep.

Becker, Schleinitz, and Lagneau (1939): goats.

Brunnich and Rawson (1921): sheep.

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom, (1944) half bloom: cows.

Christensen and Hopper (1938) half bloom, full bloom: steers.

——— and Simpson (1914): steers.

Dawson, Kopland, and Graves (1940) early bloom, half bloom, full bloom: sheep.

Edin (1917) prebloom, early bloom, full bloom: goats.

Ewing and Smith (1918): steers.

Forbes, Braman, and Kriss (1927), (1930), (1931): steers.

——— Swift, Bratzler, *et al.* (1943): steers.

Fraps (1914), (1916) overripe, (1919), (1922), (1924), (1929): sheep.

Froelich and Loewe (1936): sheep.

Hamilton, Mitchell, and Kammlade (1928): sheep.

Huffman and Duncan (1942): cows.

Hummel (1906): sheep.

Kellner (1877): sheep.

Kuehn, Haase, and Baesecke (1873): steers.

Ladd (1889): cows.

Lenkeit and Schleinitz (1940): goats.

Mitchell, Kammlade, and Hamilton (1926): sheep.

Morrow and LaMaster (1929): cows.

Muentz and Girard (1898): horses.

Myburgh (1937): sheep.

Nehring and Schramm (1939a) post bloom: sheep.

Newlander, Ellenberger, Camburn, and Jones (1938), prebloom, half bloom, (1940) early bloom: cows.

Platikanoff and Popoff (1937): sheep.

Ritzman and Benedict (1938): cows.

Ross, Bosman, and Van Wyk (1931) half bloom: steers.

Scharrer and Schreiber (1939): sheep.

Shepard and Kock (1909): sheep.



## Alfalfa hay, continued

- Snyder and Hummel (1903) full bloom: steers.  
Tangl and Weiser (1908), (1911): sheep.  
Titus (1926): steers.  
Watson, Ferguson, and Bishop (1934): sheep.  
Weiser and Kelp (1923): sheep.  
Widstoe (1898): steers.  
Willard and Clothier (1901) early bloom, half bloom, full bloom: steers.  
Winkler (1941): horses.  
Wolff, Funke, Kreuzhage, and Kellner (1881b): sheep, horses.  
———Vossler, Kreuzhage, and Kellner (1884): sheep, horses.  
Woodman and Eden (1934): sheep.

——— *hay*

- Christensen, Simpson, and Foster (1916): steers.  
Forbes, Swift, Bratzler, *et al.* (1943): steers.  
Lindsey, Beals, and Archibald (1926): horses.  
Lund (1928): cows.  
Mitchell and Hamilton (1933): swine.  
———Kammlade, and Hamilton (1928): sheep.  
Schmidt and Lagneau (1932): swine.

——— *hay, brown*

- Folger (1934): sheep.

——— *hay, dehydrated*

- Becker, Schleinitz, and Lagneau (1939): sheep, goats.  
Bruemmer (1940): sheep.  
Camburn, Ellenberger, Jones, and Crooks (1942) early bloom, (1944) half bloom: cows.  
———Froelich and Haring (1927) prebloom: sheep.  
Lenkeit and Schleinitz (1940): goats.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, half bloom, (1940) early bloom: cows.  
Richter and Ehinger (1939) prebloom: sheep.  
Woodman and Eden (1934) early bloom: sheep.

——— *hay, dehydrated*

- Møllgaard and Thorbeck (1938): cows.  
Richter (1940): swine.

——— *hay, dried on riders*

- Bruemmer (1940) prebloom: sheep.  
Kuehn, Haase, and Baesecke (1871): steers.

——— *hay, excellent quality, extra green*

- Forbes, Fries, and Braman (1925): steers.

——— *hay, leafy*

- Christensen and Hopper (1936): sheep.  
Fraps (1912), (1929): sheep.

——— *hay, stemmy*

- Fraps (1929): sheep.

——— *hay, 1st cutting*

- Dinsmore (1909): sheep.  
Headden (1904) early bloom: sheep.  
Knight, Hepner, and Morton (1906): sheep.  
———and McConnel (1908): sheep.  
Lindsey and Smith (1912) early bloom: sheep.

## Alfalfa hay, 1st cutting, continued

- Nedochetova and Goriainova (1927) prebloom, full bloom: sheep.  
Ritzman and Benedict (1938): cows.  
Sotola (1927) early bloom, half bloom, full bloom (1933b) half bloom: sheep.  
Widstoe and Stewart (1898) prebloom, half bloom, full bloom: steers.  
Woodman and Eden (1934) prebloom, (also immature, dried): sheep.

## — hay, 2d cutting

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.  
Hare (1908): steers.  
Knight, Hepner, and Morton (1906): sheep.  
— and McConnel (1908): sheep.  
Lindsey and Smith (1912) early bloom: sheep.  
Nedochetova and Goriainova (1927) prebloom: sheep.  
Noelle (1941) prebloom: sheep.  
Ritzman and Benedict (1938): cows.  
Sotola (1927) early bloom, half bloom, full bloom: sheep.  
Widstoe and Stewart (1898) prebloom, half bloom, full bloom: steers.  
Wolff, Funke, Kreuzhage, and Kellner (1878) prebloom: sheep, horses.  
Woodman and Eden (1934) full bloom: sheep.

## — hay 2d cutting

- Hare (1908): steers.

## — hay, 3d or later cutting

- Lindsey and Beals (1918): cows.  
— and Smith (1917): sheep.  
Nedochetova and Goriainova (1927) early bloom: sheep.  
Sotola (1927) full bloom, early bloom, half bloom (1933b) half bloom: sheep.  
Widstoe and Stewart (1898) full bloom: steers.  
Wolff, Funke, Kreuzhage, and Kellner (1878) prebloom: sheep, horses.

## — hay, U. S. grade No. 2 green, 2d cutting

- Hodgson and Knott (1940): sheep.

## — leaves and blossoms, 1st cutting, dry

- Sotola (1933b): sheep.

## — leaves, 2d cutting, dry

- Sotola (1933b): sheep.

## — leaves, 3d cutting, dry

- Sotola (1933b): sheep.

## — leaves, stemmy, dry

- Muentz and Girard (1898): horses

## — stems, 1st cutting, dry

- Muentz and Girard (1898): horses  
Sotola (1933b) half bloom: sheep.

## — stems, 2d cutting, dry

- Sotola (1933b) half bloom: sheep.

## — stems, 3d cutting, dry

- Sotola (1933b) half bloom: sheep.

**Alfalfa meal**

- Armsby and Fries (1915): steers.  
Fraps (1922), (1924), (1929): sheep.  
Morrow and LaMaster (1929): cows.  
Ritzman and Benedict (1938): cows.  
Scharrer and Schreiber (1939): sheep.  
Watson, Ferguson, and Bishop (1934): sheep.  
Weiser and Kelp (1923): sheep.

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**meal**

- Mitchell and Hamilton (1933): swine.  
Schmidt and Lagneau (1932): swine.  
Woodman and Eden (1934): sheep.

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**meal, dehydrated**

- Becker, Schleinitz, and Lagneau (1939): sheep, goats.  
Froelich and Haring (1927): sheep.  
Lenkeit and Schleinitz (1940): goats.

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**meal, dehydrated**

- Woodman and Eden (1934): sheep.

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**meal, poor quality**

- Weiser and Kelp (1923): sheep.

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**meal, excellent quality, extra green**

- Forbes, Fries, and Braman (1925): steers.

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**leaf meal**

- Woodman and Eden (1934): sheep.

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**fed green**

- Bizer (1940): horses.  
Bondi and Meyer (1940) early bloom: sheep.  
Dinsmore (1908): sheep.  
Kuehn, Haase, and Baesecke (1871), (1873): steers.  
Muentz and Girard (1898): horses.  
Scharrer and Schreiber (1939): sheep.  
Woodman, Evans, and Norman (1933) full bloom (1934) pasture: sheep.  
Work (1937) half bloom: steers.

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**fed green**

- Bormann and Lyczynski (1933) prebloom: swine.

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**1st cutting, fed green**

- Harcourt (1898) prebloom, early bloom, full bloom: sheep.  
Woodman, Evans, and Norman (1934) early bloom: sheep.

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**2d cutting, fed green**

- Harcourt (1897) late bloom (1898) prebloom, early bloom, full bloom: sheep.  
Noelle (1941) prebloom: sheep  
Woodman, Evans, and Norman (1934) prebloom, early bloom: sheep.

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**3d cutting, fed green**

- Noelle (1941) prebloom: sheep  
Snyder and Hummel (1903): steers.  
Woodman, Evans, and Norman (1934) prebloom: sheep.

**Alfalfa silage**

- Camburn, Ellenberger, Jones, and Crooks (1944) early bloom: cows.  
Nehring and Schramm (1939a): sheep.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, half bloom (1940) early bloom: cows.  
Rehm (1935) prebloom: sheep.  
Tangl and Weiser (1911): sheep.

**— silage**

- Bruemmer (1940): sheep.  
Kubinzky (1934): sheep.

**— silage, sun-wilted**

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, half bloom (1940) early bloom: cows.

**— silage, sun-wilted, A. I. V.**

- Camburn, Ellenberger, Jones, and Crooks (1944) full bloom: cows.

**— silage, molasses added**

- King (1943) half bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, half bloom (1940) early bloom: cows.

**— silage, molasses added**

- Forbes, Bratzler, and French (1940) early bloom: steers.  
— Swift, Bratzler, et al. (1943): steers.  
King (1943) half bloom: cows.

**— silage, sun-wilted, molasses added**

- Camburn, Ellenberger, Jones, and Crooks (1942), (1944) early bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, half bloom (1940) early bloom: cows.

**— silage, organic acids or bacteria added**

- Scharrer and Schreiber (1939), (1942c): sheep.

**— silage,  $H_2PO_4$  added**

- Camburn, Ellenberger, Jones and Crooks (1944) early bloom: cows.  
King (1943) half bloom: cows.

**— silage,  $H_2PO_4$  added**

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.  
Forbes, Bratzler, and French (1940) early bloom: steers.  
— Swift, Bratzler, et al. (1943): steers.  
King (1943) half bloom: cows.

**— silage,  $PCl_5$  added**

- Rehm (1935) prebloom: sheep.

**— silage,  $PCl_5$  added**

- Bruemmer (1940): sheep.

**— silage, sugar added**

- Bruemmer (1940): sheep.

**— silage,  $H_2SO_4$  added**

- Scharrer and Schreiber (1939): sheep.

**Alfalfa silage, 2d cutting**

Dinsmore (1909): sheep.

**Alfalfa apple mixed silage**

Knott, Murer, Hodgson, and Overholser (1938): sheep.

**Alfalfa clover mixed hay**

Taubert (1934) late bloom: horses.

—— mixed fodder, fed green

Taubert (1934) prebloom, full bloom: horses.

**Alfalfa clover grass mixed hay**

Tangl (1902): horses.

Watson, Campbell, Davidson, *et al.* (1942): steers.

**Alfalfa clover timothy mixed hay**

Watson, Campbell, Davidson, *et al.* (1941): steers.

—— Woodward, Davidson, *et al.* (1939): steers.

—— mixed silage

Livesay, Schneider, and VanLandingham (1943) full bloom: steers.

—— mixed silage, molasses added

Livesay, Schneider, and VanLandingham (1943) full bloom: steers.

**Alfalfa grass mixed hay**

Lund (1928): cows.

Muentz and Girard (1898): horses.

Tangl (1902): horses.

—— and Weiser (1906): horses.

Wiegner (1925) prebloom: sheep.

—— mixed fodder, fed green

Wiegner (1925) prebloom: sheep.

—— mixed silage

Wiegner (1925) prebloom: sheep.

**Alfalfa orchardgrass mixed hay**

Tangl and Weiser (1906): sheep.

**Alfalfa steamed potato mixed silage**

Scharrer and Schreiber (1942c): sheep.

**Alfalfa timothy mixed hay**

Lindsey, Beals, and Archibald (1926): horses.

Watson, Campbell, Davidson, *et al.* (1939): steers.

**Anise seed oil cake**

Kuehn, Koehler, Loesche, and Hoette (1894): steers.

**Apple pomace, dried**

Knott, Hodgson, and Ellington (1932): cows.

—— pomace, dried

Holdaway, Ellett, Eheart, and Miller (1927): cows.

Honcamp and Blanck (1919a): sheep.

Lindsey, Beals, and Archibald (1921): sheep.

*Apple pomace, wet*

Lindsey (1904), (1905): sheep.

*Artichoke silage*

Folger (1934): sheep.

Asbestosbush leaves. *See Leaves, asbestosbush.*

Ash leaves. *See Leaves, ash, dry.*

*Asparagus berries, dried*

Honcamp, Zimmermann, and Blanck (1917): sheep.

*— butts meal*

Folger (1940): sheep.

Aspen leaves. *See Leaves, aspen, dry.*

*Avocado oil meal*

Folger (1940): sheep.

*Babassu oil meal*

Folger (1937): sheep.

Honcamp, Mueller, and Pfaff (1924): sheep.

— and Petermann (1929): sheep.

— and Pfaff (1924): sheep.

Bagasse. *See Sorghum bagasse or Sugarcane bagasse.*

*Balsamroot fodder, arrowleaf, dry*

Kennedy and Dinsmore (1909): sheep.

*Banana meal*

Honcamp, Goettsch, Gschwendner, et al. (1912): sheep.

*— peel meal*

Honcamp, Goettsch, Gschwendner, et al. (1912): sheep.

*— plants, fed green*

French (1938a): sheep.

*Barley hay*

Jordan (1893): sheep.

Sotola (1937): sheep.

*— straw*

Wildt (1877b): sheep.

*— straw*

Honcamp, Ries, and Muellner (1914): sheep.

Popoff (1928): sheep.

*— straw, winter*

Honcamp, Nolte, and Pommer (1921): sheep.

— Ries, and Muellner (1914): sheep.

Popoff (1928): sheep.

*— straw, winter, treated with NaOH, wet*

Honcamp, Nolte, and Pommer (1921): sheep.

*— fodder, fed green*

Phelps (1898) milk stage: sheep.

— and Woods (1894) late bloom (1895) half bloom: sheep.



## Barley, grain

- Bondi and Meyer (1940): sheep.  
 Crampton and Whiting (1943): swine.  
 Fingerling (1933b): swine.  
 ——— and Honcamp (1934): swine.  
 Fraps (1932): swine.  
 Grindley, Carmichael, and Newlin (1917): swine.  
 Haberhauffe (1927): swine.  
 Honcamp, Eichler, Sachsse, and Schulz (1932): swine.  
 ——— Helms, Malkomesius, *et al.* (1932), (1935): swine.  
 ——— Neumann, and Muellner (1913): sheep.  
 ——— Sachsse, Reinmuth, and Schulz (1933): swine.  
 Kirsch and Jantzen (1941): swine.  
 Lenkeit, Becker, and Lagneau (1938): swine.  
 Mangold and Columbus (1937b), (1938b): swine.  
 ——— and Peham (1941): swine.  
 ——— and Stotz (1930): swine.  
 ——— and Columbus (1940): swine.  
 ——— Schmidt, *et al.* (1939): swine.  
 Muentz and Girard (1884a): horses.  
 Nehring and Schramm (1938), (1939a), (1940): swine.  
 Pfeiffer (1885): swine.  
 Richter and Brueggemann (1937a): swine.  
 ——— and Herbst (1938): swine.  
 ——— and Ehinger (1938): swine.  
 ——— and Gafert (1941): swine.  
 Schramm (1936): swine.  
 Snyder (1893): swine.  
 Tatarinowa (1929): swine.  
 Watson, Campbell, Davidson, *et al.* (1941): steers. (1943): swine.  
 Woehlbier and Schramm (1936c): swine.  
 Wolff, Funke, and Dittmann (1876): swine.  
 Wood and Woodman (1924): swine.

## — grain

- Crampton and Whiting (1943): swine.  
 Eskedal (1934): cows.  
 Fingerling (1933b): steers.  
 Fraps (1929): sheep.  
 French (1935a): swine.  
 Grindley, Carmichael, and Newlin (1917): swine.  
 Haberhauffe (1927): swine.  
 Honcamp and Schramm (1926a), (1926b): sheep.  
 Knibbe (1933): swine.  
 Lehmann and Vogel (1890): sheep.  
 Lindsey, Beals, and Archibald (1926): horses.  
 Schulze and Maercker (1875): sheep.  
 Shepard and Kock (1909): sheep.  
 Watson, Campbell, Davidson, *et al.* (1939), (1941): steers.  
 Wolff, Funke, and Dittmann (1876): swine.  
 ——— Kreuzhage, and Kellner (1881a): horses.  
 ——— and Mayer (1896): sheep.

## — grain, cooked

- Meissl, Strohmer, and Lorenz (1886): swine.

## — grain, heavy, screened

- Christensen and Hopper (1936): sheep.  
 Honcamp and Schramm (1926a): sheep.

*Barley, grain, light weight*

- Christensen and Hopper (1936): sheep.  
Honcamp and Schramm (1926a): sheep.  
Lindsey, Holland, and Smith (1907): sheep.

*— grain, winter*

- Knibbe (1933): swine.

*— grain, hull-less or bald*

- Nehring and Schramm (1940): swine.

*— grain, hull-less or bald*

- Knibbe (1933): swine.

*— bran*

- Honcamp and Schramm (1926b): sheep.

*— dust*

- Gamble (1906): steers.  
— and Day (1908): steers.

*— feed*

- Barnstein and Volhard (1907): sheep.  
Haberhauffe (1927): swine.  
Koenig, Fuerstenberg, and Murdfield (1907): swine.

*— flour*

- Barnstein and Volhard (1907): sheep.

*— malt sprouts*

- Fingerling (1905): sheep.

*— middlings*

- Honcamp and Schramm (1926b): sheep.  
Hoetzel and Mueller (1933): horses.

*— mixed feed and screenings*

- Honcamp and Schramm (1926b): sheep.  
Lindsey, Beals, Smith, and Archibald (1923): sheep.

*— screenings*

- Honcamp and Schramm (1926a): sheep.

*Barley corn horsebean sweet lupine oat vetch mixed fodder, dry*

- Richter and Ehinger (1939): sheep.

*— mixed fodder, dry*

- Richter (1940): swine.

*Barley oat pea vetch mixed fodder, fed green*

- Eskedal (1934): cows.

*— mixed fodder, immature, fed green*

- Bormann and Lyczynski (1933): swine.

*Barley pea mixed fodder, fed green*

- Phelps (1898): sheep.  
— and Woods (1894): sheep.

**Barnyardgrass hay**

Kellner (1886): sheep.

**Bean hay, green, dehydrated**

Becker, Schleinitz, and Lagneau (1939): sheep.

**Bean hay, moth**

Fraps (1916): sheep.

**Bean hay meal, dehydrated**

Becker, Schleinitz, and Lagneau (1939): sheep.

**Bean straw, kidney**

Titus (1924): steers.

Weiske, Kennepohl, and Schulze (1883): sheep.

**Bean fodder, mungo, fed green**

Harrison (1942): cows.

**Bean silage**

Kirsch and Jantzon (1940c): swine.

**—— silage, HCl added**

Schnepf (1936): sheep.

**—— seed**

Muentz (1880): horses.

**—— seed**

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

Lehmann and Vogel (1890): sheep.

Schulze and Maercker (1875): sheep.

Wolff and Eisenlohr (1893): sheep.

—— Funke, and Kreuzhage (1876): sheep.

—— ——— and Kellner (1879c): sheep, horses.

—— and Mayer (1896): sheep.

—— Sieglin, Kreuzhage, et al. (1890): sheep.

**—— bran**

Honcamp, Nolte, and Blanck (1919): sheep.

Linton, Wilson, and Watson (1934): sheep.

**Beans, seed, kidney**

French (1932): sheep.

**Bean silage, mungo**

Gallup and Kuhlman (1936): cows.

**Beans, seed, pinto**

Fraps (1922): sheep.

**Bean corn pea vetch mixed silage**

Pfeiffer (1941): sheep.

**—— mixed silage, H•COOH added**

Pfeiffer (1941): sheep.

**—— mixed silage, HCONH<sub>2</sub>•NaNO<sub>3</sub> added**

Pfeiffer (1941): sheep.

- Bean corn pea vetch mixed silage,  $H_2SO_4$  added  
Pfeiffer (1941): sheep.
- Bean oat pea heavy vetch mixed hay, dried on riders*  
Buenger, Fissmer, Harre, and Schmidt (1939): sheep.
- Bean oat pea vetch mixed fodder, fed green  
Fissmer (1940): sheep.
- mixed silage, mature, molasses added  
Watson and Ferguson (1934a): sheep.
- Bean steamed potato mixed silage  
Kirsch and Jantzson (1940c): swine.
- Bean vetch mixed hay, dehydrated  
Richter and Ehinger (1939): sheep.
- Bean, mungo, Guatemala gamagrass mixed fodder, fed green  
Harrison (1942): cows.
- Bean, mungo, napiergrass mixed fodder, fed green  
Harrison (1942): cows.
- Beech leaves. *See Leaves, beech, dry.*
- twigs. *See Twigs, beech, dry.*
- Beechnut oil feed with hulls*  
Honcamp (1919): sheep.
- Beet crowns and tops, sugar, dehydrated  
Richter and Ehinger (1939): sheep.
- *crowns and tops, sugar, dehydrated*  
Honcamp, Gschwendner, and Muellner (1916): sheep.  
Lenkeit and Becker (1938): sheep.  
Richter (1940): swine.
- *roots and tops, sugar, dehydrated*  
Honcamp, Gschwendner, and Muellner (1916): sheep.
- *tops, sugar, dried*  
Ehinger (1939): swine.  
Honcamp, Meier, and Naumann (1934): sheep.  
Nehring and Schramm (1942): sheep.
- *tops, sugar, dried*  
Ehinger (1939): sheep, swine.  
Honcamp and Schramm (1931a): sheep.  
——— and Wiessmann (1930): sheep.  
Morgen, Windhouser, Schoeler, and Ohlmer (1922): sheep.
- *tops, sugar, dehydrated*  
Honcamp, Meier, Schramm, and Woehlbier (1933): sheep.  
——— and Schramm (1931a): sheep.  
Lenkeit and Becker (1938): sheep.  
——— and Lagneau (1938): swine.  
Nehring and Schramm (1942): sheep.

*Beet tops, sugar, washed, chopped and dried*

Honcamp, Meier, Schramm, and Woehlbier (1933): sheep.

——— and Schramm (1931a): sheep.

——— and Weissmann (1930): sheep.

*——— seed hulls, sugar*

Eisenkolbe (1910): sheep.

Honcamp, Nolte, and Blanck (1919): sheep.

*——— straw, sugar*

Eisenkolbe (1910): sheep.

*Beets, sugar, roots*

Kirsch and Jantzon (1935a): sheep.

*——— sugar, roots*

Fingerling (1937b): steers, swine.

Jordan (1891): sheep.

Kirsch and Jantzon (1938d): swine.

Nieden zu (1940): horses.

Pfeiffer and Lehmann (1886): sheep.

Scholz (1934): horses.

Weiser and Zaitschek (1932): steers.

Woodman, Duckham, and French (1929b): swine.

*Beet crowns, sugar, fed green*

Goettingen Landw. Vers. Sta. (1900): sheep.

*——— crowns and tops, sugar, fed green*

Kirsch and Jantzon (1940b): sheep.

*——— crowns and tops, sugar, fed green*

Honcamp, Gschwendner, and Muellner (1916): sheep.

Tangl and Weiser (1911): sheep.

Woodman and Bee (1927): sheep.

*——— taproots, sugar, dried*

Honcamp, Nolte, and Blanck (1919): sheep.

*——— tops, sugar, fed green*

Watson, Ferguson, and Page (1934): sheep.

*——— tops, sugar, fed green*

Honcamp, Gschwendner, and Muellner (1916): sheep.

Lenkeit and Schleinitz (1940): goats.

*——— crown and top silage, sugar*

Kirsch and Jantzon (1940b): sheep.

*——— crown and top silage, sugar*

Honcamp, Gschwendner, and Muellner (1916): sheep.

Richter, Ferber, Moldrickx, and Chrzaszcz (1933): sheep.

Tangl and Weiser (1911): sheep.

*——— pulp silage*

Honcamp, Schramm, and Wiessmann (1930): sheep.

*——— pulp and top silage*

Woodman and Amos (1926): sheep.

*Beet silage, sugar, roots*

Buelow (1900): sheep.

Kirsch and Jantzson (1938d): swine.

——— *top silage, sugar*

Kirsch and Jantzson (1935a), (1939a), (1940a): sheep.

——— *top silage, sugar*

Honcamp, Meier, and Naumann (1934): sheep.

——— Schramm, and Woehlbier (1933): sheep.

——— and Schramm (1931a): sheep.

——— and Wiessmann (1930): sheep.

Wildt (1877b): sheep.

——— *top silage, sugar, A.I.V.*

Watson, Ferguson, and Page (1934): sheep.

——— *top silage, sugar, PCL, added*

Honcamp, Meier, and Naumann (1934): sheep.

——— *top silage, sugar, potato flakes added*

Honcamp, Schramm, and Wiessmann (1930): sheep.

*Beets, sugar, roots, dried*

Christ (1934): goats.

Fingerling (1932): steers, swine. (1937a): swine. (1937b): steers.

Hoetzel (1934): horses.

Lenkeit and Schleinitz (1940): goats.

*Beet pulp, dried*

Fraps (1919): sheep.

Pfeiffer and Lehmann (1886): sheep.

——— *pulp, dried*

Christ (1934): goats.

Fingerling (1906): sheep. (1938): steers, swine.

Honcamp (1907): sheep.

——— Schramm, and Wiessmann (1930): sheep.

Lindsey and Smith (1914): sheep.

Morgen, Beger, and Fingerling (1906): sheep.

Pfeiffer and Lehmann (1886): sheep.

Scholz (1934): horses.

Woodman and Calton (1928): sheep.

——— Duckham, and French (1929a): swine.

——— *pulp, steamed*

Fingerling (1938): swine.

——— *pulp, wet*

Buelow (1900): sheep.

Woodman and Calton (1928): sheep.

——— *pulp, urea added, dried*

Nehring and Schramm (1937a): sheep.

Woehlbier and Windheuser (1937): sheep.

——— *pulp, molasses added, dried*

Gamble (1906): steers.

Liebscher (1938): sheep.

Lindsey (1905): sheep.

——— and Smith (1914): sheep.

Woodman, Duckham, and French (1929a): swine.



**Beet top corn stover mixed silage**

Kirsch and Jantzon (1940a): sheep.

**Beet top curly leaf mallow mixed silage**

Scharrer and Nebelsiek (1939): sheep.

**Bentgrass hay, colonial**

Honcamp, Stau, and Muellner (1915): sheep.

Lindsey and Jones (1898): sheep.

**Bentgrass grass mixed hay**

Honcamp, Stau, and Muellner (1915): sheep.

**Bentgrass clover timothy mixed hay**

Hagemann (1911): steers, horses.

**Bentgrass, colonial, saltgrass mixed hay**

Lindsey and Jones (1898): sheep.

**Bermudagrass hay**

Francis and Baird (1910): sheep.

Fraps (1912), (1914), (1916): sheep.

Lander and Dharmani (1936) (immature dried): cows.

**Bermudagrass knotgrass mixed hay**

Lander and Dharmani (1932): cows.

**Bladekelp, dry**

Ringen (1939): sheep, swine.

Sheehy, Brophy, Dillon, and O'Muineachain (1942): swine.

**Blood meal**

Honcamp, Eichler, Sachsse, and Schulz (1932): swine.

———Gschwendner, and Engberding (1911): sheep.

Lindsey (1905): sheep.

Morgen, Beger, and Ohlmer (1916): sheep.

———Wagner, et al. (1919): sheep.

Wildt (1877a): sheep. (1877c): swine.

Zaitschek (1908): swine.

**Blood, soluble, dried**

Honcamp, Gschwendner, and Engberding (1911): sheep.

**Bluegrass hay**

Honcamp, Stau, and Muellner (1915): sheep.

Voeltz, Reisch, Kirsch, et al. (1928): sheep.

**Bluegrass hay, Kentucky**

Honcamp, Stau, and Muellner (1915): sheep.

Lindsey (1904): sheep.

Shepard and Kock (1909): sheep.

Steuber and Stotz (1931): sheep.

**Bluegrass hay, Sandberg**

Kennedy and Dinsmore (1909): sheep.

**Bluegrass, Kentucky, pasture**

Eheart and Pratt (1942): cows.

- Bluegrass clover timothy mixed hay  
Isaachsen, Ulvesli, and Husby (1935) prebloom, late bloom: sheep.
- Bluegrass, Kentucky, clover sweet vernalgrass mixed hay  
Lindsey, Beals, Smith, and Archibald (1923): sheep.  
——— and Smith (1910): sheep.
- Bluegrass, Kentucky, red clover mixed hay  
Lindsey, Holland, and Smith (1907): sheep.
- Bluegrass, Kentucky, white clover mixed hay  
Bruene, Richter, and Ferber (1932) prebloom (also immature dried): sheep.
- mixed, pasture  
Armsby, Frear, Caldwell, and Holter (1889): steers.
- Bluegrass, Kentucky, white clover redtop mixed hay  
Crampton, Campbell, and Lange (1940): steers.
- Bluegrass, Kentucky, grass mixed hay  
Lindsey and Smith (1914): sheep.
- Bluegrass, Kentucky, grass legume mixed hay  
Lindsey, Holland, and Smith (1907): sheep.
- Bluegrass, Kentucky, sweet vernalgrass hay  
Lindsey, Beals, and Smith (1917): sheep.
- Bluestem hay, pitted  
Lander and Dharmani (1932) late bloom: cows.
- Bluestem, India, fed green  
French (1941): sheep.
- Bone meal*  
Honcamp, Eichler, Sachsse, and Schulz (1932): swine.  
Morgen, Beger, and Ohlmer (1916): sheep.  
——— Wagner, *et al.* (1917): sheep.
- Bone and fish mixed meal*  
Kirsch and Jantzson (1941): swine.
- Bone horn dried "stick" mixed meal*  
Morgen, Beger, Wagner, *et al.* (1917): sheep.
- Brewers' dried grains*  
Arnold (1885): sheep.  
Gamble (1906): steers.  
Kuehn, Koenig, and Boettcher (1894): steers.  
Lindsey (1893), (1904): sheep.  
——— Beals, and Archibald (1926): horses.  
Tatarinowa (1929): swine.  
Wolff and Eisenlohr (1893): sheep.  
——— Sieglin, Kreuzhage, *et al.* (1890): sheep.
- *wet grains*  
Kuehn, Gerver, Kisielinsky, and Schmidt (1894): steers.
- Bristlegrass browntopmillet crabgrass knotstem pennisetum vine-grass mixed hay  
Lander and Dharmani (1929a): cows.

Bristlegrass, yellow, iwarancusagrass rooigrass sorghum mixed hay  
Lander and Dharmani (1929a): cows.

*Broadbean pod meal*  
Woodman and Evans (1940): sheep.

Brome hay  
Kirsch, Wenck, and Jantzon (1936) prebloom: sheep.  
Shaw and French (1897): steers.

Brome hay, cheatgrass  
McCall, Clark, and Patton (1943): sheep.

Brome hay, mountain  
Kennedy and Dinsmore (1909): sheep.

Brome hay, smooth  
Buenger, Harre, and Schmidt (1939): sheep.  
Fissmer (1941) prebloom: sheep.  
Shepard and Kock (1909): sheep, goats.  
Sotola (1941) late bloom: sheep.

— *hay, smooth*  
Fissmer (1941): sheep.

— *smooth, fed green*  
Sotola (1941): sheep.

Brome, soft, fescue slender oat mixed hay  
Guilbert and Goss (1944): sheep.

Brome, soft, grass mixed hay, weathered  
Hart, Guilbert, and Goss (1932): sheep.

Brome vetch mixed silage  
Kirsch and Jantzon (1932b): sheep.

*Buckwheat hulls*  
Honcamp and Blanck (1918a): sheep.

— *seed*  
Muentz and Girard (1883b): horses.

— *seed*  
French (1935b): sheep. (1935a): swine.  
Wicke and Weiske (1896a): sheep.

— *feed*  
Koenig, Fuerstenberg, and Murdfield (1907): swine.

— *middlings*  
Lindsey, Holland, and Smith (1907): sheep.  
Patterson and White (1912): steers.

Buffalograss hay  
Fraps (1912): sheep.  
Willard and Clothier (1901) (immature dried): steers.

*Bulrush hay, sea*  
Honcamp and Blanck (1917): sheep.

- Bundleflower, rayado, stems leaves pods, fed green  
Work (1938): steers.
- Burclover hay, California  
Fraps (1912): sheep.  
Guilbert and Mead (1931): sheep.
- Buttercup fodder, dry  
Maine Agr. Expt. Sta. (1888): sheep.
- Buttermilk, dried  
Honcamp, Helms, Malkomesius, *et al.* (1932): sheep, swine.
- Cabbage, whole, fed green  
Lindsey, Beals, and Smith (1917): sheep.
- *outside leaves removed, fed green*  
Lindsey, Beals, and Smith (1917): sheep.
- *leaves, fed green*  
Lindsey, Beals, and Smith (1917): sheep.  
Woehlbier and Schramm (1934): sheep.
- Cactus, pricklypear, dried  
Woodward, Turner, and Griffiths (1915): cows.
- *pricklypear, fed green*  
Hare (1908): steers.  
Woodward, Turner, and Griffiths (1915): cows.
- *pricklypear, fed green*  
Hare (1908): steers.  
Vinson (1911): sheep.
- Canarygrass hay, reed  
Voeltz, Reisch, Kirsch, *et al.* (1928): sheep.
- Canna tops, fed green  
French (1938b): sheep.
- *tubers*  
French (1938b): sheep.
- Caraway seed oil meal  
Kuehn, Thomas, and Neubert (1894): steers.
- Carob pods  
Bondi and Meyer (1940): sheep.
- *seed*  
Bondi and Meyer (1940): sheep.  
Honcamp and Gschwendner (1911): sheep.  
Weiske, Schrodte, and Leeuw (1879): sheep.
- Carpetgrass, tropical, fed green  
Harrison (1942): cows.
- Carrots, roots  
Muentz and Girard (1883b): horses.

*Carrots, roots*

Fingerling, Eisenkolbe, Just, *et al.* (1937): steers, swine.

Lindsey, Beals, and Smith (1917): sheep.

——— and Archibald (1923): sheep.

Nieschling (1935): horses.

Wolff, Funke, and Kellner (1884): horses.

*Casein*

Voeltz, Dietrich, and Deutschland (1918): sheep.

*Cassava roots*

French (1932), (1937a): sheep.

——— root meal, screened. *See Tapioca flour.*

*——— seed oil meal*

Honcamp, Zimmermann, and Blanck (1917): sheep.

*Castorbean oil meal with hulls, toxicity extracted*

Kellner, Koehler, Zielstorff, and Barnstein (1896): steers.

*Chaenostoma fodder, dry*

Botha (1938): sheep.

*Charlock seed oil meal*

Honcamp, Zimmermann, and Blanck (1917): sheep.

*Cherry leaves. See Leaves, black cherry, dry.**Chestnut residue from starch extraction, with shells*

Morgen, Beger, Wagner, *et al.* (1917): sheep.

*Chickpea straw, gram*

Lander and Dharmani (1936): cows.

*Chickpeas, gram, seed*

Honcamp and Montag (1921): sheep.

Lander and Dharmani (1924): steers.

*Chicory roots, dried*

Honcamp, Zimmermann, and Blanck (1917): sheep.

*Citrus pulp. See Lemon pulp and Orange pulp.**Clipped oat by-product. See oat by-product, clipped.**Clover hay*

Andersen and Winther (1934): cows.

Armsby (1885): sheep.

Bartlett (1904): sheep.

Buelow (1900): sheep.

Burke, Smith, and Blish (1917) full bloom: steers.

Fingerling and Honcamp (1934): sheep.

Fissmer (1940): sheep.

Gamble (1906): sheep.

Gramatzki (1933): steers, sheep.

Honcamp (1910), (1920): sheep.

——— Eichler, Helms, and Reinmuth (1929): sheep.

——— Goettsch, Gschwendner, *et al.* (1912): sheep.

——— and Gschwendner (1911): sheep.

## Clover hay, continued

- Honcamp, Gschwendner, and Engberding (1911): sheep.  
——— and Muellner (1916): sheep.  
——— Helms, Malkomesius, *et al.* (1935): sheep.  
——— and Hilgert (1932): sheep.  
——— and Kock (1920): sheep.  
——— Mueller, and Schramm (1925): sheep.  
——— Malkomesius, and Petermann (1929): sheep.  
——— Meier, and Naumann (1934): sheep.  
——— and Muellner (1914): sheep.  
——— Neumann, and Muellner (1913): sheep.  
——— and Petermann (1929): sheep.  
——— and Pfaff (1925): sheep.  
——— Sachsse, Reinmuth, and Schulz (1933): sheep.  
——— Schramm, and Wiessmann (1930): sheep.  
——— Stau, and Muellner (1915): sheep.  
Jordan (1887) late bloom: sheep.  
Joseph and Blish (1920): steers.  
Kirsch and Jantzson (1942a): sheep.  
Knieriem (1898a): cows.  
Lemke (1926) full bloom: sheep.  
Lephne (1927) full bloom: sheep.  
Mertins (1933): sheep.  
Scheunert, Klein, and Steuber (1925): sheep.  
Smelkus (1924): sheep.  
Voeltz, Jantzson, and Reih (1923): sheep.  
Watson, Ferguson, and Bishop (1934): sheep.  
Woehlbier and Schramm (1934): sheep.  
Wolff, Funke, Kreuzhage, and Kellner (1881b): sheep, horses.  
——— Vossler, Kreuzhage, and Kellner (1884) full bloom: sheep, horses.  
——— ——— and Mehllis (1884): sheep, horses.

## ——— hay

- Joseph and Blish (1920): steers.  
Kasprzik (1932): sheep.  
Kuehn, Gerver, Kisielinsky, and Schmidt (1894): steers.  
Mertins (1933): sheep.  
Mitchell, Kammlade, and Hamilton (1928): sheep.

## ——— hay, air dried

- Zielstorff and Nehring (1929a): sheep.

## ——— hay, stubble, dehydrated

- Lenkeit and Becker (1933): sheep.

## ——— hay, dehydrated

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.  
Kirsch and Jantzson (1942a): sheep.  
Voeltz, Reisch, and Jantzson (1925) full bloom: sheep.

## ——— hay, dried on riders

- Lephne (1927) early bloom, full bloom: sheep.  
Zielstorff and Nehring (1929a): sheep.

## ——— hay, weathered

- Zielstorff and Nehring (1929a): sheep.

## ——— hay, 2d cutting

- Lephne (1927) early bloom: sheep.  
Phelps and Bryant (1896): sheep.  
Zielstorff and Nehring (1929a): sheep.



**Clover hay, 2d cutting, air dried**

Phelps and Bryant (1896) late bloom: sheep.  
Zielstorff and Nehring (1929a): sheep.

**— meal**

Watson, Ferguson, and Bishop (1934): sheep.

**— fed green**

Frear, Caldwell, Holter, and Sweetser (1888) late bloom: steers.  
Harcourt (1897) late bloom, mature: sheep.

**— 2d cutting, fed green**

Phelps and Woods (1895): sheep.

**— silage**

Bartlett (1904): sheep.  
Gramatzki (1933): steers, sheep.  
Lemke (1926) full bloom: sheep.  
Mertins (1933): sheep.  
Zielstorff, Hildebrandt, and Keller (1927) early bloom: sheep.

**— silage**

Burke, Smith, and Blish (1917) full bloom: steers.  
Mertins (1933): sheep.  
Richter, Ferber, and Chrzaszcz (1932): sheep.

**— silage, 2d cutting**

Burke, Smith, and Blish (1917) full bloom: steers.

**— seed screenings**

Tangl and Weiser (1908): steers, sheep, swine.

**Clover hay, alsike**

Bartlett (1900) early bloom, late bloom: sheep.  
Maine Agr. Expt. Sta. (1888) full bloom, (1889a) full bloom: sheep.

**— silage**

Bartlett (1900) late bloom: sheep.

**— seed**

Lindsey (1905): sheep.

**Clover hay, crimson**

Emery and Kilgore (1892): sheep, goats. (1894): cows, goats.  
Phelps and Woods (1894) late bloom (1895) late bloom: sheep.  
Richter and Ehinger (1939) early bloom: sheep.

**— hay, air dried**

Phelps and Woods (1895) full bloom: sheep.

**— fed green**

Phelps and Woods (1894): sheep.

**— silage**

Niendenzu (1940): horses.

## Clover hay, Egyptian

Lander and Dharmani (1936): steers.

## — fed green

Bondi and Meyer (1940) prebloom, early bloom: sheep.

Lander and Dharmani (1936): cows.

Prescott (1920): sheep.

## Clover hay, red

Armsby and Fries (1908), (1915): steers.

— and Braman (1916): steers.

Brigl and Benedict (1933): sheep.

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.

Eskedal (1934): cows.

Hutchinson (1895): steers, sheep.

Koenig, Fuerstenberg, and Murdfield (1907) prebloom, full bloom, post-bloom: sheep.

Kuehn, Fleisher, and Striedler (1869) half bloom: steers.

Nebelsiek (1936): sheep.

Ritzman and Benedict (1938): cows.

Wolff, Funke, and Kreuzhage (1872), (1879b): sheep.

— and Kellner (1881b): sheep, horses.

Zielstorff, Hildebrandt, and Keller (1927) early bloom: sheep.

## — hay, air dried

Baseler (1936): sheep.

## — hay, 1st cutting

Baseler (1936): sheep.

Hildebrandt (1926) full bloom: sheep.

Lindsey and Smith (1912) early bloom: sheep.

Shaw and French (1897): steers.

## — hay, 1st cutting, air dried

Baseler (1936): sheep.

## — hay, 1st cutting, dried on riders

Baseler (1936): sheep.

Hildebrandt (1926) full bloom: sheep.

Kirsch and Jantzson (1942a): sheep.

Kuehn, Duve, Haase, and Baesecke (1870) early bloom, full bloom, late bloom: steers.

Voeltz, Reisch, and Jantzson (1925) full bloom: sheep.

## — hay, 2d or 3d cutting

Armsby and Fries (1905): steers.

Baseler (1936): sheep.

Hildebrandt (1926) prebloom: sheep.

Lindsey and Smith (1912) early bloom: sheep.

## — hay, 2d or 3d cutting, dried on riders

Baseler (1936): sheep.

Hildebrandt (1926): sheep.

## — fed green

Eskedal (1934): cows.

Kuehn, Fleischer, and Striedler (1869) early bloom: steers.

## Clover silage

Andersen and Winther (1934): cows.

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.

Eskedal (1934): cows.

Voeltz, Reisch, and Jantzon (1925) full bloom: sheep.

Zielstorff and Keller (1929c): sheep.

## — silage

Kubinzky (1934): sheep.

## — silage, sun-wilted

Camburn, Ellenberger, Jones, and Crooks (1942) half bloom: cows.

## — silage, 1st cutting

Baseler (1936): sheep.

## — silage, 2d cutting

Baseler (1936): sheep.

## — silage, A.I.V.

Eskedal (1934): cows.

— silage,  $H_2PO_4$  added

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom: cows.

— silage,  $PCl_5$  added

Nebelsiek (1936): sheep.

— silage,  $SO_3$  added

Nebelsiek (1936): sheep.

## — silage, molasses added

Camburn, Ellenberger, Jones, and Crooks (1942) half bloom: cows.

## — silage, sugar added

Nebelsiek (1936): sheep.

## Clover hay, white

Maine Agr. Expt. Sta. (1888) late bloom: sheep.

## Clover grass mixed hay

Dinsmore and Kennedy (1907): sheep.

Eskedal (1934): cows.

Hodgson and Knott (1940) full bloom: sheep.

——— Miller, and Murer (1938) early bloom: sheep.

Hofmeister (1873): sheep.

Honcamp and Gschwendner (1911): sheep.

——— Helms, Malkomesius, *et al.* (1932): sheep.

——— Hilgert, and Woehlbier (1932): sheep.

——— and Schramm (1931a): sheep.

——— and Wiessmann (1930): sheep.

——— Stau, and Muellner (1915): sheep.

Lindsey (1893) full bloom: sheep.

——— Smith, and Holland (1894) full bloom: sheep.

Malkomesius and Schramm (1930): sheep.

Senior and Sheehy (1941): steers.

Watson and Godden (1935) (immature dried): sheep.

——— Muir, and Davidson (1934), (1935): steers.

——— ——— and Dore (1933): steers.

——— Woodward, Davidson, *et al.* (1936b): steers.

## — mixed hay, dehydrated

Senior and Sheehy (1941): sheep.

## Clover grass mixed hay, 2d cutting

- Gramatzki (1935): sheep.  
Hodgson, Knott, Miller, and Murer (1938): sheep.  
Lindsey, Beals, and Smith (1917): sheep.  
Phelps and Bryant (1896): sheep.

## —— mixed fodder, fed green

- Eskedal (1934): cows.  
Gramatzki (1935): sheep.  
Hodgson, Knott, Miller, and Wolberg (1942) (pasture): sheep.  
—— et al. (1942) (pasture): sheep.  
Phelps and Woods (1895): sheep.  
Schmidt, Lauprecht, Dschaparidse, and Haase (1936) (pasture): sheep.  
Senior and Sheehy (1941): steers, sheep.  
Steiner (1936): sheep.  
Woodman, Blunt, and Stewart (1926) (pasture): sheep.  
—— and Norman (1932) prebloom: sheep.

## —— mixed silage

- Andersen and Winther (1934): cows.  
Eskedal (1934): cows.  
Hodgson and Knott (1940) early bloom: sheep.  
—— Miller, and Murer (1938) early bloom: sheep.  
Kirsch and Jantzon (1942a): sheep.  
Sears and Sill (1941) early bloom: cows.

## —— mixed silage

- Steiner (1936): sheep.

## —— mixed silage, stack

- Hodgson and Knott (1940): sheep.  
—— Miller, and Murer (1938) early bloom: sheep.

## —— mixed silage, A.I.V.

- Eskedal (1934): cows.  
Steiner (1936): sheep.

—— mixed silage, HCl and  $H_3PO_4$  added

- Gramatzki (1935): sheep.

—— mixed silage,  $H_2SO_4$  added

- Kirsch and Gramatzki (1936): sheep.

## —— mixed silage, molasses or sugar added

- Gramatzki (1935): sheep.  
Kirsch and Gramatzki (1936): sheep.  
Newlander, Ellenberger, and Jones (1942) full bloom: cows.

## Clover grass heavy sedge mixed hay

- Tangl and Weiser (1906): horses.

## —— mixed silage

- Tangl and Weiser (1906): steers, horses.

## Clover grass timothy weeds mixed hay

- Isaachsen, Ulvesli, and Husby (1935) prebloom, late bloom: sheep.  
Poijaervi (1934) prebloom, half bloom, post bloom: sheep.

## Clover redtop timothy mixed hay

- Lindsey and Smith (1914): sheep.

## Clover ryegrass mixed hay

Watson and Ferguson (1932b), (1937b) post bloom: sheep.

## —— mixed silage, stack

Woodman (1925b) early bloom: sheep.

## Clover timothy mixed hay

Armsby and Fries (1917): steers.

Frear (1890): steers.

Isaachsen, Ulvesli, and Husby (1935) prebloom: sheep.

Ladd (1889): cows.

Poiijaervi (1934) post bloom: sheep.

Zielstorff and Nehring (1929a): sheep.

## Clover heavy timothy mixed hay

Armsby (1898): steers.

Bartlett (1904): steers, sheep.

Isaachsen, Ulvesli, and Husby (1935) prebloom, late bloom: sheep.

Patterson and Outwater (1907): steers.

## Clover timothy mixed silage, molasses added

Newlander, Ellenberger, and Jones (1942) full bloom: cows.

## —— mixed silage, molasses added

Forbes, Bratzler, and French (1940) late bloom: steers.

—— Swift, Bratzler, et al. (1943): steers.

—— mixed silage,  $H_3PO_4$  added

Forbes, Bratzler, and French (1940) late bloom: steers.

## Clover timothy weeds mixed hay

Isaachsen, Ulvesli, and Husby (1935) prebloom: sheep.

Poiijaervi (1934) half bloom: sheep.

## Clover, crimson, ryegrass vetch mixed hay

Buenger, Schultz, Augustin, and Finzenhagen (1935): sheep.

Scharrer and Schreiber (1941a): sheep.

## —— mixed hay

Richter (1940): swine.

## —— mixed hay, dehydrated

Froelich and Haring (1927): sheep.

Richter and Ehinger (1939): sheep.

## —— mixed fodder, fed green

Fissmer (1940): sheep.

Scharrer and Schreiber (1941a): sheep.

## —— mixed silage

Scharrer and Schreiber (1941a): sheep.

Clover, crimson, vetch mixed silage,  $Ca(CHO_2)_2$  and  $NaNO_2$  added

Pfeiffer (1941): sheep.

—— mixed silage,  $H_2SO_4$  added

Pfeiffer (1941): sheep.

## Clover, red, grass mixed hay

Eskedal (1934): cows.

- Clover, red, heavy grass mixed hay  
Eskedal (1934): cows.  
Lindsey, Holland, and Smith (1907) full bloom: sheep.
- Clover, red, grass mixed fodder, fed green  
Eskedal (1934): cows.  
Watson, Ferguson, and Horton (1937) post bloom: sheep.
- Clover, red, heavy grass mixed fodder, fed green  
Eskedal (1934): cows.
- Clover, red, oat vetch mixed silage,  $\text{HCONH}_2 \cdot \text{NaNO}_3$  added  
Pfeiffer (1941): sheep.
- Clover, red, potato mixed silage  
Kirsch and Jantzon (1940c): swine.
- Clover, red, ryegrass mixed hay  
Honcamp, Muellner, and Stau (1914): sheep.  
Watson, Ferguson, and Horton (1937): sheep.
- mixed silage,  $\text{Ca}(\text{CHO}_2)_2$  and  $\text{NaNO}_2$  added  
Pfeiffer (1941): sheep.
- Clover, red, ryegrass timothy mixed silage  
Watson and Ferguson (1934a) mature: sheep.
- Clover, red, timothy mixed hay  
Armsby and Fries (1911), (1915): steers.  
Zielstorff and Keller (1929a) early bloom: sheep.  
——and Nehring (1929b): sheep.
- mixed hay, dried on riders  
Zielstorff and Keller (1929a) early bloom: sheep.  
——and Nehring (1929b): sheep.
- mixed hay, 2d cutting  
Zielstorff and Keller (1929c) early bloom: sheep.
- mixed silage, 1st cutting  
Zielstorff and Keller (1929a) early bloom: sheep.
- Clover, white, grass mixed, immature, dehydrated or sun-cured  
Hodgson and Knott (1932b): cows.  
——Graves, and Murer (1935): sheep.
- mixed fodder, fed green  
Eskedal (1934): cows.  
Hodgson, Knott, Graves, and Murer (1935) (pasture): sheep.  
Sears, Goodall, and Coop (1942) (pasture), very immature, prebloom,  
early bloom, post bloom: sheep.
- Cockchafers, dried*  
Wolff, Funke, and Dittmann (1876): swine.
- Cocoa meal*  
Aplin and Ellenberger (1927): cows.
- *shells*  
Lindsey and Smith (1914): sheep.  
Pfeiffer (1937): sheep.  
Richter and Brueggemann (1937b): sheep.



*Coconut oil meal*

- French (1933a), (1933b): sheep.  
Knieriem (1898b): sheep.  
Kuehn, Schoder, Zielstorff, and Moye (1894): steers.  
Lindsey (1914): sheep.  
——— and Smith (1914): sheep.  
Wolff, Funke, and Dittmann (1876): swine.  
——— and Kreuzhage (1882): sheep.

Cod fish meal. *See Fish meal, cod.*

*Coffee residue, chicory and coffee grains, dry*

- Lindsey, Beals, Smith, and Archibald (1923): sheep.  
Morgen, Beger, Wagner, *et al.* (1919): sheep.

Colza oil meal. *See Rape seed oil meal.*

*Conifer cone meal*

- Kotovskii and Borovkova (1938): sheep.  
——— *needle meal, fir*  
Honcamp and Gschwendner (1911): sheep.  
——— *needles, pine*  
Stutzer and Haupt (1915): sheep.

*Cordgrass hay*

- Lindsey and Jones (1898): sheep.  
Shepard and Kock (1909): sheep.

*Corn cobs, ground*

- Fraps (1919): sheep.

*—— cobs, ground*

- Fraps (1924): sheep.  
Honcamp, Nolte, and Blanck (1919): sheep.  
Kirsch and Jantzon (1940a) mature: sheep.  
Lindsey (1893): sheep.  
——— Beals, and Archibald (1926): horses.

*—— fodder, dry*

- Armsby and Caldwell (1889): steers.  
Bartlett (1904) dough stage: steers, sheep.  
Frear (1890) milk stage, dough stage: steers, sheep.  
Gamble (1905) mature (1906): steers.  
Headden (1904) late bloom: sheep.  
Hopkins (1896), (1900) mature: steers.  
Jordan (1893) (large immature) late bloom, dough stage: sheep.  
Lindsey (1905) (large immature): sheep.  
Maine Agr. Expt. Sta. (1889a), (1889b) (large immature) dough stage, mature: sheep.  
Widstoe (1898) mature: steers.  
Woll (1889): cows.

*—— fodder, dehydrated*

- Weiser and Zaitschek (1913) prebloom: steers, sheep.

*—— fodder, flint, dry*

- Ladd (1890) dough stage: cows.

Corn fodder, sweet, partly dried

Jordan (1893) mature: sheep.

Maine Agr. Expt. Sta. (1889b) mature: sheep.

— husks, dry

Fraps (1912): sheep.

Patterson (1893) mature: steers.

— husks and leaves, dry

Patterson (1896): steers.

— leaves, dry

Emery and Kilgore (1892): sheep, goats.

Patterson (1893) mature: steers.

— shucks. See Corn husks, dry.

— stover, dry

Armsby (1888): steers.

— and Fries (1915): steers.

Hopkins (1900) mature: steers.

Horn, Esat-Kadaster, and Kansu (1938): sheep.

Jordan and Jenter (1897): sheep.

Kirsch and Jantzson (1940a): sheep.

Lindsey, Holland, and Smith (1907): sheep.

Patterson (1896): steers.

Shepard and Kock (1909) mature: sheep.

Tangl and Weiser (1911): sheep.

— stover, dry

Forbes, Bratzler, and French (1940): steers.

French (1940) mature: steers.

— stover, pith removed, chopped, dry

Jordan and Jenter (1897): sheep.

Patterson (1896): steers. (1897): horses.

— stubble (stalk below the ear, no leaves), dried

Patterson (1893) mature: steers.

— tops, dry

Harrington (1891): steers.

Patterson (1893) mature: steers.

— cannery refuse, fed green

McCandlish (1920b): cows.

— fodder, fed green

Armsby (1891) full bloom (1892) late bloom, milk stage, dough stage, mature: sheep.

— Frear, Caldwell, and Holter (1889) late bloom, milk stage: sheep.

Axtmayer, Asenjo, and Cook (1938) full bloom: sheep.

Frear, Caldwell, Holter, and Sweetser (1888): steers.

Gamble (1905) mature (1906): steers.

Jordan (1891) (large immature): sheep.

Lander and Dharmani (1930): cows.

Lindsey, Holland, and Smith (1907) dough stage: sheep.

— and Smith (1912) milk stage, dough stage: sheep.

*Corn fodder, fed green*

Fingerling, Schmidt, and Hientzsch (1933): steers.

——— fodder, sweet, fed green

Armsby, Frear, Caldwell, and Holter (1889) mature: sheep.

Jordan (1891): sheep.

Phelps (1898) milk stage: sheep.

——— and Bryant (1896) milk stage: sheep.

——— and Woods (1895) milk stage: sheep.

——— silage

Armsby and Caldwell (1889): steers.

Bartlett (1904): steers, sheep.

Christensen and Hopper (1938) dough stage: steers, sheep.

Emery and Kilgore (1892): cows.

Ewing and Smith (1918): steers.

——— and Wells (1914), (1915): steers.

——— and Smith (1917): steers.

Forbes, Braman, Kriss, *et al.* (1927): steers.

Fraps (1916): sheep.

Frear (1890) dough stage: steers, sheep.

French (1932): steers, sheep. (1934) milk stage: steers.

Gamble (1905) mature (1906): steers.

Hopkins (1896): steers.

Irish (1890) overripe: sheep.

Jordan (1893) late bloom, dough stage (1894): sheep.

Kirsch and Jantzon (1933), (1934), (1935a): sheep.

Ladd (1890) milk stage: cows.

Lander and Dharmani (1930): cows.

Lindsey (1905): sheep.

——— Holland, and Smith (1907): sheep.

Livesay, VanLandingham, and Schneider (1940) dough stage: steers.

Maine Agr. Expt. Sta. (1889b): sheep.

Mertins (1933): sheep.

Nevens (1933): sheep.

Shepard and Kock (1909): sheep.

Watson, Davidson, Woodward, *et al.* (1939): steers.

——— Woodward, Davidson, *et al.* (1939): steers.

Weiser and Zaitschek (1913): steers, sheep.

Withycombe and Bradley (1908): cows.

——— and Knisely (1905): cows.

Wolberg, Hodgson, Knott, and Ashworth (1940): cows, sheep.

Woll (1889): cows.

Woodman and Amos (1928): sheep.

——— silage

Christensen and Hopper (1938) dough stage: steers.

Fingerling, Eisenkolbe, Hientzsch, *et al.* (1931): steers.

——— Schmidt, and Hientzsch (1933): steers.

Forbes, Swift, Bratzler, *et al.* (1943): steers.

Kirsch and Jantzon (1930), (1932a) milk stage, mature: sheep.

Mertins (1933): sheep.

Scharrer and Schreiber (1940b): sheep.

Watson, Davidson, Woodward, *et al.* (1939): steers.

——— Woodward, Davidson, *et al.* (1939): steers.

——— silage, steamed

Withycombe and Bradley (1908): cows.

**Corn silage, flint**

Bartlett (1897) dough stage: sheep.

Ladd (1890) dough stage: cows.

**—— silage, sweet**

Maine Agr. Expt. Sta. (1889b): sheep.

**—— stover silage**

Kirsch and Jantzson (1940a): sheep.

Lindsey, Holland, and Smith (1907): sheep.

Livesay, VanLandingham, and Schneider (1940) dough stage: steers.

Tangl and Weiser (1911): sheep.

**—— stover silage**

Hamilton and Rusk (1927) mature: cows.

**—— ear silage, ears and husks**

Livesay, VanLandingham, and Schneider (1940) dough stage: steers.

**—— cannery refuse silage**

Nevens (1933): steers.

**—— grain**

Beach (1906): cows.

Dietrich and Grindley (1914): swine.

Emery and Kilgore (1894): goats.

Forbes, Beegle, Fritz, and Mensching (1914): swine.

——Braman, Kriss, *et al.* (1931): steers.

Fraps (1932): swine.

French (1935a): swine.

Gamble and Day (1908): steers.

Grindley, Carmichael, and Newlin (1917): swine.

Haberhauffe (1927): swine.

Jordan (1886): swine.

Kirsch and Jantzson (1940a): sheep, swine.

Manzold, Stotz, Nehring, and Schramm (1940): swine.

Muentz (1880): horses.

Nehring and Schramm (1939a): swine.

Rather (1917): swine.

Ritzman and Benedict (1938): cows.

Snyder (1893): swine.

Watson, Campbell, Davidson, *et al.* (1943): swine.

Wolff, Funke, and Dittmann (1876): swine.

Zaitschek (1908): swine.

**—— grain**

Armsby and Fries (1905), (1915), (1917): steers.

——and Braman (1916): steers.

Bartlett (1897), (1900): sheep.

Emery and Kilgore (1894): goats.

Forbes, Braman, Kriss, *et al.* (1931), (1933): steers.

——Swift, Bratzler, *et al.* (1943): steers.

French (1935b): sheep. (1940): steers.

Grindley, Carmichael, and Newlin (1917): swine.

Holdaway, Ellett, and Eheart (1929): cows.

Honcamp, Schramm, and Wiessmann (1927): sheep.

Kirsch and Jantzson (1938b): sheep.

Ladd (1888): cows.

Lander and Dharmani (1924): steers.

*Corn, grain, continued*

- Lindsey, Beals, and Archibald (1926): horses.  
Patterson (1897): horses.  
Popoff (1937): sheep.  
Shepard and Kock (1909): sheep.  
Wolff, Funke, Kreuzhage, and Kellner (1879c): sheep, horses.  
———Sieglin, Kreuzhage, *et al.* (1890): sheep.  
——— and Riess (1887): horses.  
Woodman (1925a): swine.

——— *grain, cooked*

- Woodman (1925a): swine.

——— *flint, grain, Argentine*

- Fraps (1916): sheep.

——— *grain, degermed, raw or cooked*

- Mangold, Stotz, Nehring, and Schramm (1940): swine.  
Woodman and Evans (1932): swine.

——— *bran*

- Gamble (1906): steers.

——— *bran*

- Emery (1899): sheep.  
Fraps (1914), (1922): sheep.  
French (1932): sheep.  
Honcamp and Gschwendner (1911): sheep.  
Lindsey, Beals, and Archibald (1926): horses.  
——— and Smith (1917): sheep.

——— *distillers' dried grains*

- Honcamp and Gschwendner (1911): sheep.  
Lindsey, Beals, and Smith (1917): sheep.  
——— Smith, and Holland (1894): sheep.

——— *distillers' dried grains with solubles*

- Kellner, Koehler, Barnstein, and Hartsung (1898): sheep.

——— *flakes*

- Woodman (1925a): swine.

——— *germ meal*

- Bartlett (1900): sheep.  
Honcamp and Blanck (1918a): sheep.

——— *gluten feed*

- Forbes, Bratzler, and French (1940): steers.  
Honcamp and Gschwendner (1911): sheep.  
——— Schramm, and Wiessmann (1927): sheep.  
Kellner and Honcamp (1907): sheep.  
Lindsey (1893): sheep.  
——— Beals, and Smith (1917): sheep.  
——— and Archibald (1923): sheep.  
——— Holland, and Smith (1907): sheep.  
——— and Smith (1910): sheep.  
——— Smith, and Holland (1894): sheep.  
Watson, Campbell, Davidson, *et al.* (1942): steers.

*Corn gluten feed, maltose process*

Lindsey, Smith, and Holland (1894): sheep.

——— *gluten meal*

Honcamp, Schramm, and Wiessmann (1927): sheep.

Jordan (1891): sheep.

Lindsey, Beals, and Smith (1917): sheep.

——— Smith, and Holland (1894): sheep.

——— *oil meal*

Honcamp and Gschwendner (1911): sheep.

——— Schramm, and Wiessmann (1927): sheep.

Pommer (1921): sheep.

Ross, Bosman, and Van Wyk (1931): steers.

*Corn and cob meal*

Emery and Kilgore (1894): goats.

Jordan (1886): swine.

Kirsch and Jantzon (1938b): sheep. (1940a): sheep, swine.

——— *meal*

Emery and Kilgore (1894): goats.

Kirsch and Jantzon (1938b): sheep. (1940a): sheep.

Popoff (1937): sheep.

Tangl and Weiser (1913): sheep.

——— *ear chops, immature*

Kirsch and Jantzon (1940a): sheep, swine.

*Corn starch. See Starch.**Corn curly leaf mallow mixed silage*

Scharrer and Nebelsiek (1939): sheep.

*Corn pea mixed silage*

Voeltz and Reisch (1926): sheep.

*Corn light soybean mixed silage*

Bartlett (1904): sheep.

*Corn soybean mixed silage*

Bartlett (1904): steers.

*Corn, flint, sunflower horsebean mixed silage*

Bartlett (1897): sheep.

*Corn vetch mixed fodder, dehydrated*

Voeltz, Reisch, and Jantzon (1924b): sheep.

——— *mixed silage*

Voeltz, Reisch, and Jantzon (1924b): sheep.

*Cotton*

Naumann (1940): sheep.

——— *bolly refuse, dry*

Dowell and Friedemann (1918): steers.



**Cotton burs, dry**

Fraps (1919), (1929): sheep.

**Cottonseed hulls**

Emery and Kilgore (1891): cows. (1892): cows, goats.

Fraps (1929): sheep.

Harrington (1891): steers.

—— *hulls*

Emery and Kilgore (1894), (1895): steers.

Fraps (1914), (1924), (1929): sheep.

—— *hulls, delinted*

Fraps (1922): sheep.

—— *hulls, with some meal*

Armsby and Hess (1894): steers.

—— *hulls, with some meal*

Honcamp and Gschwendner (1911): sheep.

—— *whole*

Emery and Kilgore (1892): cows.

French (1933a): sheep. (1937d): swine. (1940): steers.

Lander and Dharmani (1929b), (1937): cows.

—— *whole, pressed*

Crowther and Woodman (1917a): sheep.

Eskedal (1934): cows.

Fraps (1914), (1919): sheep.

Honcamp and Gschwendner (1911): sheep.

—— Popp, and Volhard (1906): sheep.

—— *whole, roasted*

Emery and Kilgore (1892): cows, steers.

—— *kernel meal, hulls removed*

Fraps (1916): sheep.

—— *feed*

Bartlett (1904), (1905): sheep.

Eskedal (1934): cows.

Fraps (1914), (1929): sheep.

Kirsch and Jantzson (1938c): sheep.

Lander and Dharmani (1937): cows.

Lindsey, Beals, and Archibald (1926): horses.

—— Holland, and Smith (1907): sheep.

—— and Smith (1914): sheep.

Rather (1917): swine.

Voeltz, Paechtner, and Baudrexel (1912): sheep.

Weiske, Schulze, and Flechsig (1885): sheep.

Wolff, Funke, and Kreuzhage (1879b): sheep.

—— *meal*

Ewing and Wells (1915): steers.

Fraps (1929): sheep.

*Cottonseed meal*

- Armsby (1885): sheep.  
Bartlett (1904), (1905): sheep.  
Emery and Kilgore (1892): cows, steers. (1894): cows, goats.  
Eskedal (1934): cows.  
Fraps (1914), (1919), (1924), (1929): sheep. (1932): swine.  
Kuehn, Koehler, Mielcke, and Pasche (1894): steers.  
Lindsey, Beals, and Archibald (1926): horses.  
——— Smith, and Archibald (1923): sheep.  
Rather (1917): swine.  
Wolff, Funke, and Kreuzhage (1882): sheep.

*Cowpea hay*

- Emery and Kilgore (1892): sheep, goats.  
Fraps (1912) late bloom: sheep.  
French (1935c) dough stage: steers. (1937b) dough stage: sheep.

*——— fodder, fed green*

- Axtmayer, Hernandez, and Cook (1940) early bloom, full bloom, dough stage: sheep.  
Bondi and Meyer (1940) early bloom: sheep.  
Phelps and Bryant (1896) prebloom: sheep.  
——— and Woods (1895) prebloom: sheep.

*——— silage*

- Hopkins (1896): steers.

*——— seed*

- Emery (1899): sheep.  
French (1932): sheep. (1937a): sheep, swine.

*Cowpea sorghum mixed silage*

- Fraps (1914): sheep.

*Crabgrass hay*

- Emery (1899): sheep.  
——— and Kilgore (1898): sheep.  
Hutchinson (1895): sheep.

*Cutgrass, clubhead, fed green*

- French (1941): sheep.

*Dallisgrass, fed green*

- French (1941): sheep.

*Dandelion fodder, common, dry*

- Smelkus (1924): sheep.

*Danthonia hay, poverty*

- Maine Agr. Expt. Sta. (1888), (1889a): sheep.

*Dayflower fodder, fed green*

- Work (1938): steers.

*Deervetch, Spanishclover, fed green*

- Guilbert and Goss (1944): sheep.

*Distillers' dried grains.* Also see *Corn distillers' dried grains* and *Rye distillers' dried grains*.

Kellner, Koehler, Barnstein, and Hartsung (1898): sheep.

Lindsey (1904): sheep.

Risser (1904): sheep.

—— *molasses residue.* See *Molasses distillers' residue*.

—— *dried solubles*

Mangold, Stotz, Schmidt, et al. (1939): swine.

*Dodder.* See *Flaxseed screenings, mostly flax dodder*.

*Dogtoothgrass hay*

French (1931): steers. (1932): steers, sheep. (1937c): sheep.

—— *hay, 2d cutting*

French (1932): steers.

*Dogtoothgrass, giant, fed green*

French (1940): steers. (1941): sheep.

*Dogtoothgrass grass mixed fodder, fed green*

French (1937c): sheep.

—— *mixed silage*

French (1937c): sheep.

*Dolichos hay, hyacinth*

Fraps (1916): sheep.

French (1937b): sheep.

*Dreg meal*

Watson (1931a): sheep.

*Emmer, grain*

Christensen and Hopper (1936): sheep.

Hummel (1906): sheep.

Shepard and Kock (1909): sheep.

*Falseflax seed oil meal*

Honcamp, Zimmermann, and Nolte (1920): sheep.

*Felicia fodder, roughleaf, dry*

Botha (1938): sheep.

*Fennel seed oil meal*

Kuehn, Thomas and Neubert (1894): steers.

*Fescue hay, Idaho*

McCall (1940) overripe: sheep.

*Fescue hay, meadow*

Fissmer (1941) prebloom, mature: sheep.

Gregoire and Corpiaux (1914) prebloom, full bloom, mature: sheep.

Hagemann (1909): sheep.

Honcamp, Stau, and Muellner (1915) early bloom: sheep.

Kirsch, Wenck, and Jantzon (1936): sheep.

Steuber and Stotz (1931): sheep.

Voeltz (1928): sheep.

*Fescue hay*

Voeltz (1928): sheep.

*Fescue hay, red*

Honcamp, Stau, and Muellner (1915): sheep.

Steuber and Stotz (1931): sheep.

*Fescue grass mixed hay*

Watson and Ferguson (1937b) mature: sheep.

*Fescue orchardgrass mixed hay*

Watson and Ferguson (1937b) mature: sheep.

*Fig leaves. See Leaves, sycomore fig, fed green.**Fingergrass hay*

Myburgh (1937): sheep.

*Fingergrass, pentz, fed green*

French (1941): sheep.

*Fir needle meal. See Conifer needle meal, fir.**Fish meal*

Kellner (1877): sheep.

——— Just, Eisenkolbe, and Poppe (1908): swine.

Kirsch and Jantzon (1941): swine.

*——— cod, steam dried*

Honcamp, Sachsse, Reinmuth, and Schulz (1933): sheep, swine.

*——— herring*

Honcamp, Gschwendner, and Engberding (1911): sheep.

——— Sachsse, Reinmuth, and Schulz (1933): sheep, swine.

Isaachsen and Ulvesli (1926): sheep.

*——— menhaden*

Lindsey and Smith (1914): sheep.

*——— pilchard*

Honcamp, Sachsse, Reinmuth, and Schulz (1933): sheep.

*——— stickleback*

Honcamp, Sachsse, Reinmuth, and Schulz (1933): sheep.

*——— tuna*

Work (1938): steers.

*——— white*

Honcamp, Sachsse, Reinmuth, and Schulz (1933): sheep.

*Fish press water, condensed*

Lenkeit, Becker, Woldan, and Lagneau (1940): sheep, swine.

*Fish residue meal*

Lindsey and Smith (1914): sheep.

*Flax hulls*

Guilbert and Goss (1944): sheep.

*Flax hulls*

Guilbert and Goss (1944): sheep.

——— *plant by-product, dry*

Fraps (1929): sheep.

Patterson and White (1912): steers.

——— *plant by-product, dry*

Lindsey and Smith (1914): sheep.

*Flaxseed*

Wolff, Sieglin, Kreuzhage, et al. (1890): sheep.

*Flaxseed screenings, mostly flax dodder*

Tangl and Weiser (1908): sheep.

*Foxtail hay, meadow*

Hagemann (1909): sheep.

Voeltz, Reisch, Kirsch, et al. (1928) (immature dried): sheep.

*Fruit pit oil meal*

Honcamp (1919): sheep.

*Gamagrass hay, Florida*

Fraps (1912): sheep.

*Gamagrass, Guatemala, 1st cutting, fed green*

Axtmayer, Asenjo, and Cook (1938): sheep.

Harrison (1942): cows.

——— *Guatemala, 2d cutting, fed green*

Axtmayer, Asenjo, and Cook (1938): sheep.

*Gamagrass, Guatemala, velvetbean mixed fodder, fed green*

Harrison (1942): cows.

*Garbage, dried*

Woodman and Evans (1942): swine.

*Giantreed fodder, dry*

Honcamp and Blanck (1917): sheep.

*Gluten*

Fingerling, Koehler, Reinhardt, et al. (1914): swine.

*Goober, Congo*

Honcamp, Goettsch, Gschwendner, et al. (1912): sheep.

*Goosegrass hay*

Fraps (1929): sheep.

*Grape marc meal*

Folger (1940): sheep.

——— *marc meal*

Folger (1940): sheep.

Honcamp and Blanck (1919a): sheep.

*Grape marc meal, molasses added*

Weiser (1906): steers, horses.

—— marc, fed fresh

Fabre (1909): sheep, horses.

*Grass mixed hay*

Armsby and Caldwell (1888) (immature dried): cows.

Dinsmore and Kennedy (1907): sheep.

Koenig, Fuerstenberg, and Murdfield (1907) prebloom, fullbloom, post bloom: sheep.

Lander and Dharmani (1932) late bloom, overripe: cows.

Lindsey and Jones (1898): sheep.

—— and Smith (1912) full bloom: sheep.

Senior and Sheehy (1941): sheep.

Tangl (1902): horses.

—— and Weiser (1906): steers, sheep, horses.

—— mixed hay, dehydrated

Hodgson and Knott (1932a) (immature): cows.

Newlander and Jones (1932) (immature): cows.

Senior and Sheehy (1941): sheep.

Watson and Godden (1935) (immature): sheep.

Watson (1931a), (1931b) prebloom (1931c), (1934): sheep.

—— and Ferguson (1932a) (immature), (1936c): sheep.

—— and Bishop (1934): sheep.

Woodman, Bee, and Griffith (1930) (immature): sheep.

—— mixed hay, weathered

Fingerling (1905): sheep.

Kirsch (1929): sheep.

Senior and Sheehy (1941): sheep.

Voeltz and Kirsch (1928a): sheep.

—— immature, air dried, Europe

Wolff, Funke, Kreuzhage, and Kellner (1879b): sheep, horses.

—— meadow, immature dried, British Isles or Europe

Woodman and Evans (1936): sheep.

Wolff, Funke, Kreuzhage, and Kellner (1879b): sheep.

—— meal, dehydrated

Watson (1931a): sheep.

Woodman, Bee, and Griffith (1930): sheep.

—— mixed hay, 2d cutting

Kellner (1886): sheep.

Lindsey and Beals (1918): cows.

Phelps (1898): sheep.

—— and Bryant (1896): sheep.

—— and Woods (1894): sheep.

—— mixed, fed green, British Isles

Drew, Deasy, O'Sullivan, *et al.* (1938) early bloom: steers, sheep.

Senior and Sheehy (1941): sheep.

Watson (1934): sheep.

—— and Ferguson (1932a) (pasture) (1934a) prebloom (1934b) prebloom (1936a), (1936b): sheep.

—— and Horton (1937) early bloom, post bloom: sheep.

—— and Page (1934) prebloom: sheep.



## Grass mixed, fed green, British Isles, continued

- Woodman, Blunt, and Stewart (1927) (pasture): sheep.  
—— Norman, and Bee (1928), (1929) (pasture): sheep.  
—— and French (1931) (pasture): sheep.  
—— and Oosthuizen (1934): sheep.

—— *mixed pasture, British Isles*

- Woodman and Norman (1934): swine.

—— *mixed, pasture or immature, fed green, Eastern United States*

- Armsby and Caldwell (1888): cows.  
Newlander and Jones (1932): cows.

—— *mixed, fed green, Europe*

- Blechs Schmidt (1933) (pasture): horses.  
Honcamp (1915): sheep.  
Kienle (1939) full bloom, late bloom: steers.  
Liebscher (1941): sheep.  
Morgen, Beger, and Westhausser (1911): sheep, goats.  
Nietsch (1935) (pasture): horses.

—— *mixed, fed green, Europe*

- Fingerling, Bretsch, Loesche, and Arndt (1914) prebloom: sheep, swine.

—— *mixed, 2d cutting, late fall after snow, fed green*

- Kirsch (1929): sheep.

—— *silage, British Isles*

- Drew, Deasy, O'Sullivan, et al. (1938) early bloom: steers, sheep.  
Watson (1931c) prebloom (1931d), (1931e) full bloom: sheep.  
—— and Ferguson (1934a) prebloom (1936a), (1936b), (1937a): sheep.  
—— and Page (1934) immature, prebloom: sheep.

—— *silage, East Africa*

- French (1932): sheep.

—— *silage, Europe*

- Baseler (1936): sheep.  
Kasprzik (1932) prebloom: sheep.  
Rehbock (1933): sheep.  
Wiegner, Crasemann, and Magasanic (1923): sheep.  
Wolff and Eisenlohr (1892): sheep.

—— *silage, Europe*

- Koudela and Schneiberg (1930) full bloom: sheep.  
Rehbock (1933): sheep.  
Voeltz and Kirsch (1928b): sheep.  
Wolff and Eisenlohr (1892): sheep.

—— *silage, late fall after snow*

- Kirsch (1929): sheep.

—— *silage, New Zealand*

- Sears, Sill, and Newbold (1942) immature, prebloom, early bloom, mature: cows, sheep.

—— *silage, Washington*

- Hodgson and Knott (1937): sheep.

## Grass silage, A.I.V.

Drew, Deasy, O'Sullivan, *et al.* (1938) early bloom: steers, sheep.

Watson (1934): sheep.

——— and Ferguson (1936a), (1936b), (1936c): sheep.

## ——— silage, A.I.V. acid and sugar added

Watson and Ferguson (1936a): sheep.

## ——— silage, HCl added

Rehbock (1933): sheep.

## ——— silage, lactic acid bacteria and dried whey added

Watson (1934): sheep.

——— and Ferguson (1934b) prebloom: sheep.

## ——— silage, molasses added

Sears, Sill, and Newbold (1942) immature: sheep.

Watson (1934): sheep.

——— and Ferguson (1934a) prebloom (1936b), (1936c): sheep.

## ——— silage, molasses and acid added

Watson and Ferguson (1936a), (1936b): sheep.

——— and Page (1934) prebloom: sheep.

## ——— silage, salt added

Watson and Ferguson (1934b) mature: sheep.

## Grass legume mixed hay

Crasemann (1924): sheep.

French (1938c): sheep.

Tangl and Weiser (1906): sheep, horses.

Woodward, Davidson, Watson, *et al.* (1938): steers.

## ——— mixed fodder, fed green

Crasemann (1924): sheep.

Eskedal (1934): cows.

## ——— mixed silage

Crasemann (1924): sheep.

## Grass weeds mixed hay

Tangl (1902): horses.

## Guar hay

Fraps (1929): sheep.

## ——— fodder, fed green

Lander and Dharmani (1930): cows.

## Guineagrass, fed green

Axtmayer, Asenjo, and Cook (1938): sheep.

French (1941): sheep.

Harrison (1942): cows.

Lander and Dharmani (1936): cows.

## ——— silage

French (1933b): sheep.

## Hawksbeard fodder, gray, dry

Kennedy and Dinsmore (1909): sheep.

## Hay, British Isles

Crowther and Woodman (1917) mature: sheep.

Drew, Deasy, O'Sullivan, *et al.* (1938) late bloom: steers, sheep.

Watson and Ferguson (1937b) full bloom, late bloom, post bloom, mature, overripe: sheep.

\_\_\_\_\_ and Horton (1937) early bloom, post bloom: sheep.

Woodman and Bee (1927): sheep.

\_\_\_\_\_ and Evans (1939): sheep.

## \_\_\_\_\_ mixed, Colorado

Headden (1904): sheep.

## \_\_\_\_\_ East Africa

French (1932), (1935b), (1937a): sheep. (1938h) post bloom, (1940) mature: steers.

\_\_\_\_\_ and Hornby (1934) mature, (1935): steers, sheep.

## \_\_\_\_\_ Eastern Canada

Watson, Davidson, Woodward, *et al.* (1939): steers.

\_\_\_\_\_ Woodward, Davidson, *et al.* (1938): steers.

## \_\_\_\_\_ mixed, Eastern United States

Holdaway, Ellett, and Eheart (1929): cows.

## \_\_\_\_\_ meadow, Europe

Arnold (1885): sheep.

Barnstein (1914): sheep.

Baseler (1936): sheep.

Bruemmer (1940): sheep.

Buelow (1900): sheep.

Buenger and Fissmer (1941): sheep.

Christ (1934): goats.

Diakow, Prokofiew, Knjaginitchew, *et al.* (1929): sheep.

Dietrich and Koenig (1891): steers.

Ehinger (1939): sheep.

Fingerling (1905), (1906): sheep.

\_\_\_\_\_ Eisenkolbe, and Hientzsch, *et al.* (1931): steers.

Fissmer (1938), (1940): sheep.

Friedlaender (1908): sheep.

Froelich and Loewe (1936): sheep.

Gabriel (1890), (1891): sheep.

\_\_\_\_\_ and Gottwald (1887): sheep.

Gottwald (1888): sheep.

Grandeau and Leclerc (1886): horses.

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

Hagemann (1909): sheep. (1911): steers, horses.

Heide, Klein, and Zuntz (1913): steers.

Herbst (1938): sheep.

Hirsch (1928): sheep.

Hofmeister (1864): sheep.

Honcamp (1906), (1915), (1919), (1923b): sheep.

\_\_\_\_\_ and Baumann (1921a), (1921b): sheep.

\_\_\_\_\_ and Blanck (1917), (1918a), (1918b), (1919b): sheep.

\_\_\_\_\_ and Gschwendner (1911): sheep.

\_\_\_\_\_ and Muellner (1916): sheep.

\_\_\_\_\_ and Montag (1921): sheep.

\_\_\_\_\_ Mueller, and Pfaff (1924): sheep.

\_\_\_\_\_ Pommer, and Soika (1924): sheep.

\_\_\_\_\_ Muellner, and Stau (1914): sheep.

\_\_\_\_\_ Nolte, and Blanck (1919): sheep.

## Hay, meadow, Europe, continued

- Honcamp, Popp, and Volhard (1906): sheep.  
—— Reich, and Zimmermann (1921): sheep.  
—— Ries, and Muellner (1914): sheep.  
—— Schramm, and Wiessmann (1927): sheep.  
—— Stau, and Muellner (1915): sheep.  
—— Zimmermann, and Blanck (1917), (1919): sheep.  
—— ——— and Nolte (1920): sheep.  
Kellner (1879), (1880): sheep. (1881): horses.  
—— and Honcamp (1907): sheep.  
—— and Koehler (1898): steers.  
—— ——— Barnstein, and Hartsung (1898): sheep.  
—— ——— *et al.* (1896): steers.  
—— ——— Zielstorff, and Barnstein (1906): sheep.  
—— Zahn, and Gillern (1901): sheep.  
Kienle (1939): steers.  
Kirsch and Jantz (1942b): sheep.  
Knieriem (1898a): cows. (1898b), (1900): sheep.  
Koehler, Honcamp, Just, *et al.* (1903): sheep.  
Koudela and Schneiberg (1930) full bloom: sheep.  
Koukl and Curin (1932): sheep.  
—— and Jirasek (1938): sheep.  
Kreusler, Havenstein, Hornberger, and Prehn (1879): steers.  
Krzywanek and Brueggemann (1941a), (1941b): steers.  
Kubinzky (1934): sheep.  
Kuehn, Boettcher, Schoder, *et al.* (1894): steers.  
—— Gerdes, Koch, and Raab (1894): steers.  
—— Gerver, Kisielinsky, and Schmidt (1894): steers.  
—— ——— Kelbe, and Schmoeger (1876): steers.  
—— ——— Schmoeger, *et al.* (1883): steers.  
—— ——— Thomas, and Struve (1894): steers.  
—— Koehler, Loesche, and Hoette (1894): steers.  
—— ——— Mielcke, and Pasche (1894): steers.  
—— Koenig, and Boettcher (1894): steers.  
—— Schmidt, and Dietzell (1872): steers.  
—— Schoder, Zielstorff, and Moye (1894): steers.  
—— Thomas, and Neubert (1894): steers.  
—— ——— Martin, *et al.* (1894): steers.  
Lehmann and Vogel (1890): sheep.  
Lenkeit and Becker (1938): sheep.  
—— ——— Woldan, and Lagneau (1940): sheep.  
—— ——— and Schleinitz (1940): goats.  
—— ——— and Lagneau (1940): sheep.  
Liebscher (1938), (1941), (1942a), (1942b): sheep.  
Lund (1928): cows.  
Luske (1940): sheep.  
Mangold and Columbus (1937a), (1938a): sheep.  
—— ——— and Peham (1941): sheep.  
—— ——— and Stotz (1935), (1937): sheep.  
—— ——— and Columbus (1940): sheep.  
Meier (1933): sheep.  
Morgen, Beger, and Fingerling (1905), (1906): sheep.  
—— ——— and Ohlmer (1916) (also hay meal): sheep, swine.  
—— ——— Wagner, *et al.* (1917): sheep.  
—— ——— and Westhausser (1909): sheep.  
—— Windhouser, Schoeler, and Ohlmer (1922): sheep.

## Hay, meadow, Europe, continued

- Muentz (1880): horses.  
—— and Girard (1880): horses.  
Naumov (1929): sheep.  
Nebelsiek (1936): sheep.  
Nehring (1935): sheep.  
—— and Keller (1932): sheep.  
—— and Schramm (1939a), (1939b): sheep.  
Neumann and Loesche (1912): sheep.  
Pfeiffer and Lehmann (1886): sheep.  
Pommmer (1921): sheep.  
Popoff (1928), (1937): sheep.  
Pucci (1913): steers.  
Rehbock (1933): sheep.  
Richter and Brueggemann (1937a): sheep.  
—— and Ehinger (1938): sheep.  
—— and Gafert (1941): sheep.  
—— and Herbst (1938): sheep.  
Sanson (1888): horses.  
Scharer and Nebelsiek (1938b), (1939): sheep.  
—— and Schreiber (1939), (1940a), (1940b), (1940c), (1940d), (1940e), (1941a) prebloom, (1941b), (1942a), (1942b), (1942c), (1942d), (1942e): sheep.  
Schmidt and Schleinitz (1933): sheep.  
Schulze and Maercker (1871): sheep.  
Stutzer (1915a): sheep.  
—— and Goy (1913): sheep.  
—— and Haupt (1915): sheep.  
Tangl, Korbuly, and Weiser (1905): sheep, horses.  
—— and Weiser (1906): steers, sheep, horses. (1908): steers. (1913): sheep.  
—— and Zaitschek (1905): steers, sheep, horses.  
Voeltz (1919): sheep.  
—— and Baudrexel (1912): sheep.  
—— and Deutschland (1913): sheep.  
—— and Kirsch (1928b): sheep.  
—— Muhr, Baumann, and Drauzburg (1914): sheep.  
—— Paechtnr, and Baudrexel (1913): sheep.  
—— *et al.* (1913): sheep.  
Weiniger (1910): sheep.  
Weiser (1906): horses.  
—— and Zaitschek (1920): sheep. (1932): steers.  
Weiske, Dehmel, Kennepohl, *et al.* (1885): sheep.  
—— and Flechsig (1886): sheep.  
—— Kennepohl, and Schulze (1879): sheep.  
—— Schulze, and Flechsig (1885): sheep.  
—— Schrodtt, and Leeuw (1879): sheep.  
Wicke and Weiske (1896a): sheep.  
Wildt (1877b): sheep.  
Woehlbier and Schramm (1936a), (1936c): sheep.  
—— and Herold (1936): sheep.  
Wolff and Eisenlohr (1892), (1893): sheep.  
—— Funke, Fleischer, and Skalweit (1873): sheep.  
—— and Kellner (1884): horses.  
—— and Kreuzhage (1876), (1879a), (1879c): sheep. (1881): sheep, horses.  
—— and Kellner (1877), (1878), (1879b), post bloom, overripe, (1879c), (1881a), (1881b): sheep, horses. (1879a): horses.  
—— and Mayer (1896): sheep.

## Hay, meadow, Europe, continued

- Wolff, Sieglin, Kreuzhage, and Mehlis (1887): horses.  
\_\_\_\_\_ *et al.* (1890): sheep.  
\_\_\_\_\_ and Riess (1887): horses.  
\_\_\_\_\_ Vossler, Kreuzhage, and Mehlis (1884): sheep, horses.  
Zielstorff (1917): sheep.
- \_\_\_\_\_ *meadow, Europe*  
Morgen, Beger, and Ohlmer (1916): sheep.  
Schulze and Maercker (1871): sheep.  
Wolff and Kreuzhage (1895): horses.
- \_\_\_\_\_ *meadow, acid soil, Europe*  
Nehring and Keller (1932): sheep.
- \_\_\_\_\_ *meadow, alkaline soil, Europe*  
Nehring and Keller (1932): sheep.
- \_\_\_\_\_ *meadow, air dried, Europe*  
Baseler (1936): sheep.  
Honcamp (1915): sheep.  
Liebscher (1941), (1942a): sheep.  
Rehbock (1933): sheep.  
Wolff, Funke, Kreuzhage, and Kellner (1879b) post bloom: sheep, horses.
- \_\_\_\_\_ *meadow, dehydrated, Europe*  
Honcamp (1915): sheep.  
Meier (1933): sheep.  
Morgen, Beger, and Westhausser (1911): sheep, goats.
- \_\_\_\_\_ *meadow, fertilized, Europe*  
Hirsch (1928): sheep.  
Nehring and Keller (1932): sheep.
- \_\_\_\_\_ *meadow, fertilized and limed, Europe*  
Nehring and Keller (1932): sheep.
- \_\_\_\_\_ *meadow, limed, Europe*  
Nehring (1935): sheep.  
\_\_\_\_\_ and Keller (1932): sheep.
- \_\_\_\_\_ *mountain, Europe*  
Tangl, Korbuly, and Weiser (1905): sheep, horses.  
\_\_\_\_\_ and Weiser (1906): sheep, horses.
- \_\_\_\_\_ *upland, Europe*  
Honcamp and Muellner (1914): sheep.  
Nehring (1938): sheep.
- \_\_\_\_\_ *meadow, sewage-irrigated, Europe*  
Anonymous (1908): sheep.  
Friedlaender (1908): sheep.  
Voeltz, Dietrich, and Deutschland (1918), (1921): sheep.  
Wiegner, Crasemann, and Magasanic (1923): sheep.
- \_\_\_\_\_ *India*  
Warth (1928) mature: steers.



## Hay, Japan

Katayama (1914): sheep.

Kellner (1888): sheep.

## —— prairie, Kansas

Willard and Clothier (1901): steers.

## —— lowland, Nevada

Dinsmore and Kennedy (1907): sheep.

## —— New England

Arkell (1911): sheep.

Beach (1906): cows.

## —— prairie, North Dakota

Christensen and Hopper (1932): steers.

—— *bush, Queensland*

Brunnich and Rawson (1921): sheep.

## —— prairie lowland, South Dakota

Shepard and Kock (1909): sheep.

## —— prairie upland, South Dakota

Shepard and Kock (1909): sheep.

## —— prairie, Texas

Fraps (1914), (1916), (1919), (1929): sheep.

## —— western mixed, Washington

Wolberg, Hodgson, Knott, and Ashworth (1940): cows, sheep.

## —— meadow, 1st cutting, dried on riders, Europe

Baseler (1936): sheep.

Liebscher (1942a): sheep.

Meier (1933): sheep.

## —— 2d cutting, British Isles

Drew, Deasy, O'Sullivan, *et al.* (1938): steers, sheep.

Watson, Ferguson, and Horton (1937): sheep.

## —— 2d cutting, East Africa

French and Hornby (1934): steers, sheep.

## —— meadow, 2d or 3d cutting, Europe

Baseler (1936): sheep.

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

Kasprzik (1932): sheep.

Kuehn, Schmidt, and Dietzell (1872): steers.

Lund (1928): cows.

Luske (1940): sheep.

Meier (1933): sheep.

Nehring and Keller (1932): sheep.

Scharrer and Nebelsiek (1938c): sheep.

Schulze and Maercker (1871): sheep.

Wolff and Eisenlohr (1892) overripe: sheep.

—— Funke, Fleischer, and Skalweit (1873): sheep.

—— Kreuzhage (1879a), (1882): sheep.

Hay, meadow, 2d and 3d cutting, dehydrated, Europe

Meier (1933): sheep.

Richter and Ehinger (1939): sheep.

——— 2d and 3d cutting, dried on riders, Europe

Baseler (1936): sheep.

Meier (1933): sheep.

——— meadow, 2d cutting, limed, Europe

Nehring (1935): sheep.

——— and Keller (1932): sheep.

——— meal, meadow, Europe

Morgen, Beger, and Ohlmer (1916): swine.

——— meal, meadow, Europe

Morgen, Beger, and Ohlmer (1916): sheep.

*Heath, crossleaf, dry*

Honcamp and Blanck (1918b): sheep.

*Heather, Scotch, dry*

Honcamp and Blanck (1918b): sheep.

*Hemp Screenings*

Richter and Ehinger (1940): sheep, swine.

*Hempseed oil meal*

Folger (1937): sheep.

Knieriem (1898b): sheep.

*Hemp vetch mixed silage*

Kirsch and Jantzson (1931): sheep.

*Heronbill hay*

Guilbert and Goss (1944): sheep.

Hart, Guilbert, and Goss (1932): sheep.

*Herring fish meal. See Fish meal, herring.*

*Hominy feed*

Armsby and Fries (1915), (1917): steers.

Lindsey (1905): sheep.

——— Holland, and Smith (1907): sheep.

*Hops, dried spent*

Davies and Sullivan (1927): sheep.

Kellner (1879): sheep.

Voeltz, Muhr, Baumann, and Drauzburg (1914): sheep.

Weiske, Kennepohl, and Schulze (1879): sheep.

*Horn meal*

Morgen, Beger, Wagner, *et al.* (1917), (1919): sheep.

*Horsebean straw*

Weiske, Kennepohl, and Schulze (1883): sheep.

——— fodder, fed green

Bondi and Meyer (1940): sheep.

*Horsebean seed*

Muentz and Girard (1883b): horses.

*Horsebean vetch mixed hay*

Richter (1940): swine.

*Horsechestnuts, shells removed*

Gottwald (1888): sheep.

*Itchgrass goldplume rhaps mixed hay*

Lander and Dharmani (1928): cows.

*Ivory nut meal*

Beals and Lindsey (1916): sheep.

Lindsey, Beals, and Smith (1917): sheep.

——— *residue meal*

Morgen, Beger, and Ohlmer (1916): swine.

——— *residue meal*

Morgen, Beger, and Ohlmer (1916): sheep.

*Jackbeans, seed*

Barnstein (1914): sheep.

Fraps (1916): sheep.

*Japanesemillet hay, dehydrated*

Newlander (1935b): cows.

——— *fodder, fed green*

Phelps and Bryant (1896): sheep.

*Johnsongrass hay*

Emery and Kilgore (1894): goats.

Fraps (1912): sheep.

Hutchinson (1895): sheep.

*Kale, marrow, dry*

Edin and Sunderlin (1930): steers.

Kirsch and Jantzson (1935b): sheep.

*Kale, fed green*

Withycombe and Bradley (1908): cows.

——— *blue thickstem, fed green*

Schmidt and Schleinitz (1933): sheep.

——— *marrow, fed green*

Buenger, Schultz, Fissmer, and Finzenhagen (1935): sheep.

——— Werner, Glet, *et al.* (1933): sheep.

——— Schultz, and Keseling (1933): sheep.

Edin and Sunderlin (1930): steers.

Fissmer (1940): sheep.

Kirsch and Jantzson (1935a): sheep.

Richter and Ferber (1933b): sheep.

Schmidt and Schleinitz (1933): sheep.

Watson, Ferguson, and Page (1934): sheep.

Woodman and Evans (1936): sheep.

*Kale, fed green*

Watson (1940): sheep.

Woehlbier and Schramm (1934): sheep.

Woodman and Evans (1936): sheep.

—— *thousand head, fed green*

Woodman and Evans (1936): sheep.

—— *leaves, marrow, fed green*

Woehlbier and Schramm (1934): sheep.

—— *stems, fed green*

Woehlbier and Schramm (1934): sheep.

—— *silage, marrow*

Kirsch and Jantzon (1934), (1935b): sheep.

Richter and Ferber (1933b): sheep.

—— *silage*

Hellberg (1942a): sheep.

—— *silage, HCl and H<sub>3</sub>PO<sub>4</sub> or A.I.V. acid added*

Kirsch and Jantzon (1935b): sheep.

Watson, Ferguson, and Page (1934): sheep.

*Kaliharigrass, fed green*

Botha (1938): sheep.

*Kangaroograss, dry*

Botha (1938): sheep.

—— *fed green*

Botha (1938): sheep.

*Kangaroograss tanglehead mixed hay*

Lander and Dharmani (1929a): cows.

*Kapok oil meal*

French (1938f): steers.

Honcamp, Zimmermann, and Blanck (1917): sheep.

Morgen, Beger, Wagner, *et al.* (1917): sheep.

*Karroobush, dry*

Botha (1938): sheep.

*Kelp meal. See Bladekelp or Rockweed, dry.**Lactic acid*

Voeltz, Paechtner, and Baudrexel (1913): sheep.

*Leadtree, fodder, whitepopinac, fed green*

Work (1937): steers.

*Leaves, alder, dry*

Isaachsen, Hoie, and Engelschion (1922b): sheep.

—— *asbestosbush, dry*

French (1932): sheep.

*Leaves, ash, dry*

Isaachsen, Hoie, and Engelschion (1922b): sheep.

*— aspen, dry*

Isaachsen, Hoie, and Engelschion (1922): sheep.

*— beech, dry*

Lehmann (1895): sheep.

*— black cherry, dry*

Honcamp and Blanck (1918c): sheep.

*— sycomore fig, fed green*

French (1938g): sheep.

*— live oak, dry*

Fraps (1924): sheep.

*— black poplar, dry*

Honcamp and Blanck (1918c): sheep.

*— willow, dry*

Honcamp and Blanck (1918c): sheep.

*— rosewood, fed green*

Lander and Dharmani (1924): steers.

*— silage, rosewood*

Lander and Dharmani (1927): steers.

*Leaves and twigs, poplar, dry*

Wildt (1877b): sheep.

*Lemon pulp, dried*

Mead and Guilbert (1927): sheep.

*Lentil husks, common, dry*

Linton, Wilson, and Watson (1934): sheep.

*— seed*

Voeltz, Paechtner, and Baudrexel (1913): sheep.

*Leptotaenia fodder, carrotleaf, dry*

Kennedy and Dinsmore (1909): sheep.

*Lespedeza hay, Korean*

Swanson and Herman (1943) prebloom: cows.

*Lespedeza seed*

Swanson and Herman (1943): cows.

*Linseed capsule chaff*

Fissmer (1938): sheep.

Nehring and Schramm (1937b): sheep, swine.

*— capsule chaff, molasses added, dry*

Nehring and Schramm (1937b): sheep, swine.

*— oil meal, old process*

Watson, Campbell, Davidson, *et al.* (1941): steers.

*Linseed oil meal, old process*

- Bartlett (1898): sheep.  
Carbery, Chatterjee, and Hye (1934): steers.  
Christensen and Hopper (1938): steers.  
Forbes, Beegle, Fritz, and Mensching (1914): swine.  
Fraps (1929): sheep.  
Godden (1920a): sheep.  
Honcamp, Malkomesius, and Petermann (1929): sheep.  
Kuehn, Schmidt, and Dietzell (1872): steers.  
Lindsey (1893): sheep.  
——— Beals, and Archibald (1926): horses.  
Watson, Campbell, Davidson, *et al.* (1939), (1940), (1941): steers.  
——— Woodward, Davidson, *et al.* (1936a): steers.  
Wolff, Funke, and Kreuzhage (1872), (1879b): sheep.

*——— oil meal, solvent process*

- Honcamp, Malkomesius, and Petermann (1929): sheep.  
Lindsey (1893): sheep.  
——— Smith, and Holland (1894): sheep.

*——— oil meal, 15% urea added*

- Mangold and Stotz (1937): sheep.

*Live oak leaves. See Leaves, live oak, dry.**Lovegrass hay, Lehmann*

- Botha (1938) prebloom: sheep.

*Lupine hay*

- Heidepriem (1873) late bloom: sheep.

*Lupine hay, little, Nevada*

- Kennedy and Dinsmore (1909): sheep.

*Lupine hay, sweet*

- Kirsch (1935) post bloom: sheep.  
——— and Jantzon (1939b): sheep.

*——— hay, dehydrated*

- Buenger, Fissmer, Harre, and Schmidt (1939): sheep.  
Richter, Herbst, and Ehinger (1938): sheep.

*——— hay, green, dehydrated*

- Gretsch (1939) prebloom: horses.

*——— hay, sweet yellow*

- Nehring and Schramm (1939a): sheep.

*——— hay, dehydrated*

- Nehring, Schramm, and Malkomesius (1939): sheep.  
Richter and Ehinger (1939): sheep.

*——— hay, dehydrated*

- Richter (1940): swine.

*——— pods, sweet, dry*

- Mangold and Columbus (1938a): sheep.

*——— straw*

- Heidepriem (1873): sheep.





*Lupine straw*

- Honcamp, Ries, and Muellner (1914): sheep.
- fodder, sweet, fed green  
Bondi and Meyer (1940) full bloom: sheep.  
Fissmer (1940): sheep.  
Kirsch (1935) full bloom, post bloom, mature: sheep, swine.  
Steensberg and Winther (1938) full boom, late bloom: cows.
- silage  
Kasprzik (1932) full bloom, milk stage: sheep.
- *silage, bitter blue*  
Herbst (1938): sheep.  
Richter and Ferber (1933a): sheep.
- *silage, bitter white*  
Herbst (1938): sheep.
- *silage, bitter yellow*  
Herbst (1938): sheep.
- silage, sweet  
Kirsch and Kasprzik (1934) dough stage: sheep.
- silage, sweet blue  
Kirsch and Jantzson (1938a) dough stage: sheep.
- silage, sweet yellow  
Herbst (1938) full bloom: swine.  
Kirsch and Jantzson (1938a) dough stage: sheep.
- *silage, sweet yellow*  
Herbst (1938) full bloom: sheep.
- silage, sweet, A.I.V.  
Steensberg and Winther (1938) late bloom, dough stage: cows, steers.
- seed  
Gabriel (1890), (1891): sheep.  
Morgen, Windhouser, Schoeler, and Ohlmer (1922): sheep.
- *seed, bitter*  
Honcamp, Mueller, Pommer, and Soika (1924): sheep.  
Kellner (1880): sheep.
- *seed, bitterness extracted*  
Gabriel (1890): sheep.  
Honcamp, Mueller, Pommer, and Soika (1924): sheep.  
Kellner (1880): sheep. (1881) (wet): horses.  
Naumov (1929): sheep.  
Stutzer and Goy (1913): sheep.  
Wolff, Sieglin, Kreuzhage, *et al.* (1890): sheep.
- *seed, sweet blue*  
Kirsch and Jantzson (1938a): sheep, swine.  
Mangold and Columbus (1937a): sheep.  
— and Lintel (1935): swine.  
— and Stotz (1935): sheep.

Lupine seed, sweet green

Kirsch (1935) or  
—— and Kasprzik (1935): sheep, swine.

—— seed, sweet green

Kirsch (1935) or  
—— and Kasprzik (1935): sheep, swine.

—— seed, sweet yellow

Kirsch and Jantz (1938a): sheep, swine.  
Mangold and Columbus (1937a), (1938b): swine.  
—— and Lintel (1935): swine.  
—— and Stotz (1935): sheep.  
Schmidt, Schleinitz, and Lagneau (1935): sheep, swine.

—— bran, bitterness extracted

Honcamp, Mueller, Pommer, and Soika (1924): sheep.

—— flakes, bitterness extracted

Honcamp, Mueller, Pommer, and Soika (1924): sheep.

Lupine, sweet yellow, oat mixed fodder, fed green

Ehrenberg, Nieschling, and Lipinski (1935): horses.

Mallow hay

Woehlbier, Schramm, and Herold (1936): sheep.

—— hay, curly

Woehlbier, Schramm, and Herold (1936): sheep.

—— hay, smooth

Woehlbier, Schramm, and Herold (1936): sheep.

—— straw

Woehlbier, Schramm, and Herold (1936): sheep.

—— fed green

Bondi and Meyer (1940): sheep.  
Richter and Ehinger (1938): sheep.

—— fed green

Richter and Ehinger (1938): swine.

—— curly, fed green

Scharrer and Nebelsiek (1938a): sheep.

—— seed

Froelich and Loewe (1936): sheep.

—— seed, roasted

Froelich and Loewe (1936): sheep.

—— seed, oil meal, solvent process

Froelich and Loewe (1936): sheep.

Malt sprouts

Armsby (1885): sheep.

Lindsey (1904): sheep.

—— Holland, and Smith (1907): sheep.

Wolff, Sieglin, Kreuzhage, et al. (1890): sheep.

*Malt sprout extract*

Morgen, Beger, and Westhausser (1909): sheep.

*Mangels, roots*

Kirsch and Jantzon (1934): sheep.

Watson, Woodward, Davidson, *et al.* (1938): steers.

Zaitschek (1912): swine.

——— *roots*

Eskedal (1934): cows.

Fingerling (1934): steers, swine.

Goettingen Landw. Vers. Sta. (1900): sheep.

Honcamp and Schramm (1931b): sheep.

Jordan (1891): sheep.

Kirsch and Jantzon (1930), (1932a), (1940b): sheep. (1937): swine.

Lindsey, Beals, and Smith (1917): sheep.

Watson, Woodward, Davidson, *et al.* (1938): steers.

Weiser and Zaitschek (1932): steers.

*Mangel crowns and tops, fed green*

Kirsch and Jantzon (1940b): sheep.

——— *silage, roots*

Zaitschek (1912): swine.

——— *silage, roots*

Voeltz, Reisch, and Jantzon (1924a): sheep.

——— *crown and top silage*

Kirsch and Jantzon (1940b): sheep.

——— *top silage*

Kirsch and Jantzon (1933): sheep.

——— *top silage, wilted*

Kirsch and Jantzon (1940b): sheep.

*Marabu pods, dry*

French (1934): sheep.

*Marsh hay*

Honcamp and Muellner (1914): sheep.

Nehring (1938): sheep.

Richter and Brueggemann (1935): sheep.

Shepard and Kock (1909): sheep.

Tangl and Weiser (1906): sheep, horses.

*Meadow hay. See Hay, meadow.**Meat and bone scrap*

Fraps (1932): swine.

Honcamp, Eichler, Sachsse, and Schulz (1932): swine.

*Meat meal. See Tankage.*

——— *scrap, beef*

Honcamp, Gschwendner, and Engberding (1911): sheep.

*Medic seed, black, ground*

Honcamp and Blanck (1918a): sheep.

*Mellon's food by-product from barley, malt, wheat bran and flour*  
Lindsey and Smith (1914): sheep.

Menhaden fish meal. *See Fish meal, menhaden.*

*Mesquite bean, common*

Fraps (1924): sheep.

Work (1937): steers.

Milk, cow's

Fingerling (1908): calves.

Sweshnikowa (1929): calves.

Wellmann (1914): swine.

—— *skimmed, dried*

Honcamp, Helms, Malkomesius, et al. (1932): sheep, swine.

—— *partly skimmed*

Hughes and Cave (1931): calves.

—— *skimmed, centrifugal*

Fingerling (1908): calves.

—— *skimmed, centrifugal*

Forbes, Beegle, Fritz, and Mensching (1914): swine.

French (1937d): swine.

—— *skimmed, gravity*

Bartlett (1897): sheep.

—— *skimmed, reinforced*

Wellmann (1914), (1918): swine.

—— *skimmed, fat added and emulsified*

Fingerling (1908): calves.

Wellmann (1914), (1918): swine.

Milk, mare's

Frenzel (1937): foals.

Kleinert (1941): foals.

Milkvetch hay, Chinese

Iwata (1926): sheep.

Millet hay

Fraps (1912): sheep.

—— *hay, foxtail*

Jordan (1891): sheep.

—— *hulls*

Honcamp (1906): sheep.

—— *fodder, foxtail, fed green*

Bondi and Meyer (1940): sheep.

Jordan (1891): sheep.

Phelps and Woods (1895): sheep.

*Millet, grain*

French (1935b): sheep.

Mixed hay. *See* Hay, mixed.

*Molasses*

Kellner, Zahn, and Gillern (1901): sheep.

Lindsey, Holland, and Smith (1907): sheep.

Voeltz, Paechtner, Baudrexel, *et al.* (1913): steers, sheep.

——— *cane*

Fraps (1908): steers.

Lindsey and Smith (1910): sheep.

——— *distillers' residue*

Voeltz, Dietrich, and Deutschland (1918): sheep.

Molasses peat. *See* peat, molasses added.

*Molasses yeast mixture*

Mangold, Columbus, and Peham (1941): sheep, swine.

*Molassesgrass, fed green*

Axtmayer, Asenjo, and Cook (1938): sheep.

——— Hernandez, and Cook (1938), (1940): sheep.

*Moorgrass hay*

Honcamp and Nolte (1919): sheep.

*Moorgrass grass mixed hay*

Woodman and Evans (1930): sheep.

*Mountainbush, bitter*

Kennedy and Dinsmore (1909): sheep.

*Muhly hay, bush*

Fraps (1929): sheep.

*Mustard seed oil cake*

Honcamp, Zimmermann, and Nolte (1920): sheep.

*Napiergrass, fed green*

Axtmayer, Asenjo, and Cook (1938): sheep.

——— Hernandez, and Cook (1938), (1940): sheep.

French (1941): sheep.

Harrison (1942): cows.

Kidder (1939): steers.

Lander and Dharmani (1936): steers.

Work (1937), (1938): steers.

*Napiergrass pigeonpea mixed fodder, fed green*

Axtmayer, Hernandez, and Cook (1938), (1940): sheep.

*Napiergrass velvetbean mixed fodder, fed green*

Harrison (1942): cows.

Native hay. *See* Hay.

*Nettle meal*

Honcamp, Nolte, and Blanck (1919): sheep.

*Nigerseed oil meal*

- Honcamp and Gschwendner (1911): sheep.  
Koukl and Curin (1932): sheep.

*Oak leaves. See leaves, live oak, dry.**Oat hay*

- Bartlett (1898) full bloom, milk stage, dough stage: sheep.  
Fraps (1912): sheep.  
Lander and Dharmani (1929b) milk stage (1930), (1935): cows.  
Phelps and Bryant (1896) milk stage: sheep.  
Ritzman and Benedict (1938): cows.  
Sotola (1937) milk stage, dough stage, mature: sheep.  
Weiser and Zaitschek (1932): steers.

—— hay, dehydrated  
Newlander (1935b): cows.

—— *by-product, clipped*  
Fraps (1922), (1924): sheep.

—— *chaff*  
Honcamp (1906): sheep.  
Lehmann (1895): sheep.

—— feed. *See Oat mill feed.*

—— hulls  
Gamble (1906): steers.  
Lathrop and Bohstedt (1938): horses.  
Watson, Davidson, Woodward, *et al.* (1939): steers.  
—— Muir, and Davidson (1934): steers.

—— *hulls*  
Buckley, Broughton, and Ruffner (1912): steers.  
Honcamp and Blanck (1918a): sheep.  
Lenkeit, Schleinitz, and Lagneau (1940): sheep.  
Lindsey and Beals (1920): sheep, horses.  
—— and Archibald (1926): horses.  
Mitchell and Hamilton (1933): swine.  
Watson, Davidson, Woodward, *et al.* (1939): steers.  
—— Muir, and Davidson (1934): steers.

—— hull clippings. *See Oat by-product, clipped.*

—— mill feed  
Lathrop and Bohstedt (1938): cows, sheep, swine, horses.  
Watson, Muir, and Davidson (1934): steers.  
—— ——— and Dore (1933): steers.

—— *mill feed*  
Fraps (1922), (1924): sheep.  
Lindsey and Beals (1920): sheep, horses.  
—— and Archibald (1926): horses.  
Watson, Muir, Davidson, and Dore (1933): steers.

—— straw  
Dunbar (1925): horses.  
Gamble (1906): steers.  
Hamilton, Mitchell, and Kammlade (1928): sheep.



## Oat straw, continued

- Jordan (1887): sheep.  
Kellner, Koehler, Zielstorff, and Barnstein (1906): sheep. (1896): steers.  
Knight, Hepner, and McConnel (1908): sheep.  
Shepard and Kock (1909): sheep.  
Watson, Davidson, Woodward, *et al.* (1939): steers.  
Wolff, Funke, and Kreuzhage (1879c): sheep.

## — straw

- Fissmer (1940): sheep.  
Forbes, Braman, Kriss, *et al.* (1933): steers.  
Godden (1920a): sheep.  
Honcamp, Nolte, and Pommer (1921): sheep.  
— and Pommer (1921): sheep.  
— Ries, and Muellner (1914): sheep.  
Kellner, Koehler, Barnstein, *et al.* (1896): steers.  
Lehmann (1895): sheep.  
Popoff (1928): sheep.  
Watson, Davidson, Woodward, *et al.* (1939): steers.  
Wolff and Kreuzhage (1895): horses.

— straw, treated with  $\text{Ca}(\text{OH})_2$ 

- Honcamp and Pommer (1921): sheep.

— straw, treated with  $\text{NaOH}$ 

- Godden (1920a), (1920b): sheep.  
Honcamp, Nolte, and Pommer (1921): sheep.  
— and Pommer (1921): sheep.

## — fodder, fed green

- Lander and Dharmani (1930): cows.  
Phelps and Bryant (1896) milk stage: sheep.  
— and Woods (1895): sheep.  
Taubert (1934) milk stage: horses.

## — silage

- Lander and Dharmani (1930): cows.  
Livesay, Schneider, and VanLandingham (1943) dough stage: steers.

## — silage, molasses added

- Livesay, Schneider, and VanLandingham (1943) dough stage: steers.

## Oats, grain

- Gamble (1906): steers.  
Grandeau and Leclerc (1888): horses.  
Kellner (1877): sheep.  
Muentz (1880): horses.  
— and Girard (1883a): horses.  
Rather (1917): swine.  
Shepard and Kock (1909): sheep.  
Watson, Campbell, Davidson, *et al.* (1941): steers. (1943): swine.  
Weiske (1892), (1894): sheep.

## — grain

- Bartlett (1900): sheep.  
Crampton and Whiting (1943): swine.  
Eskedal (1934): cows.  
Fraps (1922): sheep.  
Honcamp, Schramm, and Stotz (1928): sheep:

*Oats, grain, continued*

- Honcamp, Schramm, and Wiessmann (1928): sheep.  
Hoetzel (1934): horses.  
—— and Mueller (1933): horses.  
Kellner (1881): horses.  
Knieriem (1900): sheep.  
Koudela and Zavada (1930): sheep.  
Lindsey, Beals, and Archibald (1926): horses.  
Patterson (1897): horses.  
Schulze and Maercker (1875): sheep.  
Shepard and Kock (1909): sheep.  
Tangl, Korbuly, and Weiser (1905): sheep, horses.  
—— Weiser, and Zaitschek (1905): sheep.  
Watson, Campbell, Davidson, *et al.* (1939), (1941): steers.  
Wolff, Funke, Fleischer, and Skalweit (1873): sheep.  
—— and Kellner (1884): horses.  
—— Kreuzhage, and Kellner (1877), (1879a)): sheep, horses.  
(1881a): horses.  
—— and Kreuzhage (1895): horses.  
—— Sieglin, Kreuzhage, and Mehli (1887): horses.  
—— et al. (1890): sheep.  
—— and Reiss (1887): horses.  
Woodman, Evans, and Menzies Kitchin (1932): swine.

*—— rolled*

- Fraps (1922): sheep.

*—— grain, mill or low grade*

- Christensen and Hopper (1938): steers.  
Fraps (1924): sheep.

*Oat dust. See Oat shorts.**—— middlings*

- Lindsey, Holland, and Smith (1907): sheep.

*—— screenings*

- Honcamp, Schramm, and Wiessmann (1928): sheep.

*—— shorts*

- Gamble (1906): sheep.  
—— and Day (1908): steers.  
Shuttleworth (1900): sheep.

*—— shorts*

- Lenkeit, Schleinitz, and Lagneau (1940): sheep, swine.

*Oat pea mixed hay*

- Bartlett (1900): sheep.  
Zielstorff and Keller (1929b) late bloom: sheep.

*—— mixed fodder, fed green*

- Phelps (1898): sheep.  
—— and Bryant (1896): sheep.  
—— and Woods (1895): sheep.

**Oat pea mixed silage**

Bartlett (1900): sheep.

Hodgson and Knott (1937), (1940): sheep.

——— Miller, and Murer (1938): sheep.

Zielstorff and Keller (1929b): sheep.

**Oat pea sunflower vetch mixed fodder, fed green**

Isaachsen and Ulvesli (1929a): sheep.

——— *mixed fodder, fed green*

Isaachsen and Ulvesli (1929b): sheep.

——— *mixed silage*

Isaachsen and Ulvesli (1929a): sheep.

**Oat pea vetch mixed fodder, fed green**

Voeltz, Jantzon, and Korsch (1927b): sheep.

——— *mixed silage*

Voeltz, Jantzon, and Korsch (1927b): sheep.

——— *mixed silage*

Kubinzky (1934): sheep.

**Oat vetch mixed hay**

Bartlett (1900): sheep.

Bondi and Meyer (1940): sheep.

Lindsey, Smith, and Holland (1894) late bloom: sheep.

Morrow and LaMaster (1929): cows.

Popoff (1928): sheep.

Woodman (1922) late bloom: sheep.

**Oat light vetch mixed hay**

Bondi and Meyer (1940): sheep.

**Oat vetch mixed hay meal**

Morrow and LaMaster (1929): cows.

——— *mixed fodder, fed green*

Bondi and Meyer (1940): cows.

Woodman (1922): sheep.

——— *mixed silage*

Woodman (1922): sheep.

——— *mixed silage*

Wood and Woodman (1921): sheep.

**Oatgrass hay, tall**

Gregoire and Corpiaux (1914) prebloom, full bloom, mature: sheep.

Holy (1911): sheep.

Kirsch and Jantzon (1931): sheep.

**Oil**

Wicke and Weiske (1896b): sheep.

**Oil fungus (*Endomyces vernalis*)**

Voeltz, Dietrich, and Deutschland (1921): sheep.

**Olive pulp meal**

Mead and Guilbert (1927): sheep.

*Orange culls*

Bondi and Meyer (1942): sheep.

——— *pulp, dried*

Mead and Guilbert (1926): sheep.

——— *pulp silage*

Bondi and Meyer (1942): sheep.

——— *pulp silage*

Bondi and Meyer (1942): sheep.

*Orchardgrass hay*

Fissmer (1941): sheep.

Holy (1911): sheep.

Honcamp, Stau, and Muellner (1915): sheep.

Ladd (1888): cows.

Maine Agr. Expt. Sta. (1888): sheep.

——— *hay*

Fissmer (1941): sheep.

*Orchardgrass ryegrass mixed hay*

Watson and Ferguson (1937b): sheep.

——— *mixed fodder, fed green*

Watson, Ferguson, and Page (1934): sheep.

*Orchardgrass ryegrass mixed silage*

Watson, Ferguson, and Page (1934): sheep.

*Ossein*

Morgen, Beger, Wagner, *et al.* (1919): sheep.

*Oxeyedaisy fodder, dry*

Maine Agr. Expt. Sta. (1888): sheep.

*Paintedcup fodder, scarlet, dry*

Kennedy and Dinsmore (1909): sheep.

*Palm kernel oil meal*

Crowther and Woodman (1917a): sheep.

Kuehn, Schmidt, and Dietzell (1872): steers.

Pommer (1921): sheep.

Voeltz, Paechtner, Baudrexel, *et al.* (1913): steers, sheep.

Weiniger (1910): sheep.

Wolff, Funke, and Kreuzhage (1876): sheep.

——— *kernel oil meal, doumpalm*

Morgen, Beger, and Ohlmer (1916): swine.

——— *kernel oil meal, doumpalm*

Morgen, Beger, and Ohlmer (1916): swine.

——— *kernel oil meal, molasses added*

Honcamp, Mueller, Pommer, and Soika (1924): sheep.

*Panicum hay*

Myburgh (1937): sheep.

**Paragrass hay**

Fraps (1912): sheep.

— **fed green**

Axtmayer, Asenjo, and Cook (1938): sheep.

— Hernandez, and Cook (1940): sheep.

Harrison (1942): cows.

Work (1937): steers.

**Paragrass pigeonpea mixed fodder, fed green**

Axtmayer, Hernandez, and Cook (1940): sheep.

**Para rubber meal. *See Rubber seed oil meal.*****Paspalum, fed green**

Harrison (1942): cows.

**Pasture. *See grass, clover grass mixed, immature, or plant species in pasture.*****Pea hay**

Knight, Hepner, and McConnel (1908): sheep.

Wolff, Funke, and Kreuzhage (1879c) dough stage: sheep.

— ***hulls or pods, dry***

Honcamp (1906): sheep.

— and Gschwendner (1911): sheep.

Woodman and Evans (1940): sheep.

— **straw**

Hackedorn and Sotola (1920) mature: steers.

Knott, Tretsven, and Hodgson (1933) mature: cows.

Koenig, Fuerstenberg, and Murdfield (1907): sheep.

— ***straw***

Honcamp, Nolte, and Pommer (1921): sheep.

— and Pommer (1921): sheep.

— Ries, and Muellner (1914): sheep.

— ***straw, treated with NaOH, wet***

Honcamp, Nolte, and Pommer (1921): sheep.

— and Pommer (1921): sheep.

— **vines, from canneries, dehydrated and sun-cured**

Hodgson and Knott (1938): sheep.

— **fodder, fed green**

Bondi and Meyer (1940) early bloom: sheep.

Phelps and Woods (1895) prebloom: sheep.

— **vine silage**

Hodgson and Knott (1938), (1940): sheep.

**Peas, seed**

Snyder (1893): swine.

Wolff, Funke, and Dittmann (1876): swine.

— **seed**

Bartlett (1889): sheep.

French (1935a): swine.

Honcamp and Montag (1921): sheep.

Wolff, Funke, and Kreuzhage (1881): sheep, horses.

*Peas, seed, cooked*

Wildt (1877c): swine.

*Pea bran*

Gamble (1906): sheep.

Shuttleworth (1900): sheep.

*bran*

Koenig, Fuerstenberg, and Murdfield (1907): swine.

Linton, Wilson, and Watson (1934): sheep.

*feed*

Knott, Tretsvén, and Hodgson (1933): cows.

*Pea vetch mixed silage*

Richter and Herbst (1938): sheep.

*Peanut hay, without nuts or with few nuts*

Emery and Kilgore (1894): goats.

Fraps (1916), (1919): sheep.

*hay, with nuts*

Fraps (1912), (1916): sheep.

*hulls with a few nuts*

Fraps (1916), (1919), (1922), (1929): sheep.

Lindsey, Beals, Smith, and Archibald (1923): sheep.

——— Smith, and Holland (1894): sheep.

*tops, fed green*

French (1932): sheep.

*kernels, hulls removed*

Fraps (1916): sheep.

*Peanuts, with hulls*

Fraps (1916): sheep.

*Peanut oil*

Fingerling, Eisenkolbe, and Hientzsch (1938): swine

——— Koehler, Reinhardt, *et al.* (1914): swine.

*oil meal*

Fraps (1919): sheep.

French (1932): steers. (1933a), (1934): sheep. (1935a): swine.

Kuehn, Gerver, Thomas, and Struve (1894): steers.

Lindsey, Beals, Smith, and Archibald (1923): sheep.

Voeltz, Jantzon, and Reih (1923): sheep.

Wolff, Funke, and Kreuzhage (1882): sheep.

*skins*

Lindsey, Beals, Smith, and Archibald (1923): sheep.

*Pear pomace*

Crasemann and Tscherniak (1941): swine.

*Pearlmillet hay*

Emery and Kilgore (1894): goats.

*fodder, fed green*

Lander and Dharmani (1936): cows.



## Pearlmillet, grain

French (1937d): swine.

## Peat

Fraps (1916): sheep.

Goy (1913): sheep.

Kellner, Zahn, and Gillern (1901): sheep.

Pfeiffer and Einecke (1904), (1905): sheep.

——— *molasses added*

Goy (1913): sheep.

——— *treated with HCl*

Godden (1920b): sheep.

Stutzer (1915a): sheep.

——— *treated with NaOH, molasses added*

Goy (1913): sheep.

Peavine hay (*Lathyrus* spp.)

Dinsmore (1908): sheep.

Groh and Gaetz (1916): sheep.

Hodgson and Knott (1936): sheep.

——— *fodder, thickleaf, dry*

Kennedy and Dinsmore (1909): sheep.

——— *fodder, fed green*

Bondi and Meyer (1940): sheep.

## Peavine seed, grass

Bondi and Meyer (1940): sheep.

Honcamp and Montag (1921): sheep.

## Perilla oil meal

Folger (1937): sheep.

Honcamp, Reich, and Zimmermann (1912): sheep.

## Phacelia fodder, tansy, dry

Scharrer and Schreiber (1940c): sheep.

——— *fodder, tansy, fed green*

Scharrer and Schreiber (1940c): sheep.

——— *fodder, tansy, fed green*

Scharrer and Schreiber (1940c): sheep.

——— *silage, tansy*

Scharrer and Schreiber (1940c), (1941b): sheep.

## Pigeonpea fodder, fed green

Axtmayer, Hernandez, and Cook (1938) prebloom: sheep.

Work (1937): steers.

——— *seed*

French (1935a): swine.

Pilchard fish meal. *See Fish meal, pilchard.*

## Pineapple pulp, dried

Mead and Guilbert (1927): sheep.

Work (1938): steers.

Pine needles. *See Conifer needles, pine.*

Poplar leaves and twigs. *See Leaves and twigs, poplar, dry.*

—— twigs. *See Twigs, poplar, dry.*

*Poppy seed oil meal*

Buelow (1900): sheep.

Buenger and Fissmer (1941): sheep.

Honcamp, Zimmermann and Blanck (1919): sheep.

Kuehn, Boettcher, Schoder, *et al.* (1894): steers.

Scharrer and Schreiber (1942a): sheep.

*Pork cracklings, ground*

Dietrich and Grindley (1914): swine.

Schramm (1936): swine.

*Postum by-product from molasses, roasted wheat, and wheat bran*

Lindsey and Smith (1914): sheep.

*Potato seedballs, dry*

Voeltz and Baudrexel (1912): sheep.

—— tops with seedballs, dry

Voeltz and Baudrexel (1912): sheep.

—— tops, dry

Honcamp (1923b): sheep.

Voeltz and Baudrexel (1912): sheep.

—— and Deutschland (1914): sheep.

Wildt (1877b): sheep.

—— tubers

Bollmann (1932): swine.

—— tubers

Bollmann (1932): cows, steers, swine.

Jordan (1887): sheep.

Kirsch and Jantzon (1938d): swine.

Nieschling (1934): horses.

Wolff, Funke, and Kellner (1884): horses.

—— and Kreuzhage (1872): sheep.

Woodward, Davidson, Watson, *et al.* (1938): steers.

—— cooked

Bollmann (1932): swine.

Gramatzki (1935): swine.

Wildt (1877c): swine.

Wolff, Funke, and Dittmann (1879): swine.

—— cooked

Bollmann (1932): cows, steers, swine.

Jordan (1887): sheep.

Kirsch and Jantzon (1937), (1938d): swine.

Mangold, Stotz, and Columbus (1936): swine.

—— peelings

Lenkeit and Schleinitz (1940): goats.

Woodman and Evans (1943b): swine.

**Potato silage**

Mertins (1933): sheep.

— *silage*

Kirsch and Jantzon (1938d): swine.

Mertins (1933): sheep.

— *silage, steamed*

Bollmann (1932): swine.

Gramatzki (1933), (1935): swine.

Kirsch and Jantzon (1940c): swine.

— *silage, steamed*

Bollmann (1932): cows, steers, swine.

Kirsch and Jantzon (1938d): swine.

Scharrer and Schreiber (1942e): sheep.

— *top silage*

Hellberg (1942b): sheep.

Voeltz, Baudrexel, and Deutschland (1914): sheep.

— *top silage, sugar added*

Schultz, Augustin, and Finzenhagen (1935): sheep.

— *flakes*

Voeltz, Muhr, Baumann, and Drauzburg (1914): swine.

— *flakes or flour*

Fingerling (1933a): steers, swine.

Honcamp and Gschwendner (1910): sheep.

Kellner, Just, Eisenkolbe, and Poppe (1908): sheep, swine.

— Volhard, and Honcamp (1902): sheep.

Mangold, Stotz, and Columbus (1936): swine.

Stutzer and Haupt (1915): sheep.

Woodman and Evans (1939), (1943a): sheep, swine.

Woodward, Davidson, Watson, et al. (1938): steers.

— *flakes, 15% urea added*

Mangold and Stotz (1937): sheep.

— *pulp, raw, pressed, dried*

Bizer (1940): horses.

Honcamp and Gschwendner (1910): sheep.

— — — and Engberding (1910): sheep.

Kellner and Neumann (1910): swine.

— *-protein pulp flakes*

Mangold and Columbus (1937b): swine.

Nehring and Schramm (1938): swine.

— *spent residue*

Heide, Klein, and Zuntz (1913): steers.

Mueller (1931): horses.

Voeltz, Paechtner, and Baudrexel (1913): sheep.

— — — — — et al. (1913): steers, sheep.

**Potato starch. See Starch.****Potato, steamed, sugar beet mixed silage**

Kirsch and Jantzon (1938d): swine.

*Potato, steamed, rutabaga mixed silage*

Kirsch and Jantzon (1938d): swine.

*Potatoes and mineral yeast, dried*

Mangold, Stotz, and Columbus (1940): sheep, swine.

*Potato spent residue and starch, dried*

Voeltz, Paechtner, and Baudrexel (1913): sheep.

*Prairie hay. See Hay, prairie.**Proso, grain*

Snyder and Hummel (1903): swine.

*— grain*

Shepard and Kock (1909): sheep.

*Pumpkin seed hulls*

Liebscher (1942b): sheep.

*Pumpkins, entire*

Zaitschek (1906): swine.

*— entire*

Lindsey, Beals, and Smith (1917): sheep.

Zaitschek (1906): steers.

*— seeds removed*

Lindsey, Beals, and Smith (1917): sheep.

*Pumpkin seed meal*

Honcamp and Gschwendner (1911): sheep.

Liebscher (1942b): sheep

Wicke and Weiske (1896a): sheep.

*— seed oil meal, solvent process*

Liebscher (1942b): sheep.

*Prunes, dried, ground*

Folger (1940): sheep.

*Quackgrass hay*

Maine Agr. Expt. Sta. (1888), (1889a): sheep.

*— meal*

Morgen, Beger, Wagner, *et al.* (1919): sheep.

*Radish, oilseed, serratella mixed silage*

Kirsch and Jantzon (1932b): sheep.

*Radish, oilseed, vetch mixed silage*

Kirsch and Jantzon (1931): sheep.

*Raisin pulp, dry*

Mead and Guilbert (1926): sheep.

*Rape, dehydrated*

Richter and Ehinger (1939): sheep.

*— dehydrated*

Richter (1940): swine.

*Rape seed pod meal*

Honcamp and Blanck (1918a): sheep.

——— *straw*

Honcamp, Nolte, and Pommer (1921): sheep.

——— Ries, and Muellner (1914): sheep.

——— *straw, treated with NaOH, wet*

Honcamp, Nolte, and Pommer (1921): sheep.

——— *fed green*

Adams and Garrett (1940): sheep.

Emery (1899): sheep.

Scharrer and Schreiber (1942b): sheep.

*Rape, bird, fed green*

Lander and Dharmani (1927): steers.

*Rape silage, winter*

Scharrer and Schreiber (1942b): sheep.

——— *seed*

Kirsch (1936): sheep.

——— *seed oil meal*

Knieriem (1898b): sheep.

Kuehn, Schmidt, and Dietzell (1872): steers.

Lander and Dharmani (1937): cows.

Woehlbier and Schramm (1936a): sheep.

*Redtop hay*

Maine Agr. Expt. Sta. (1888), (1889a): sheep.

*Redtop timothy mixed hay*

Lindsey (1905): sheep.

*Reeds. See Giantreed fodder, dry.**Reed silage*

Zaitschek (1929): sheep.

*Reed, common, reedgrass sedge mixed hay*

Hagemann (1911): horses.

*Reedgrass hay, bluejoint*

Maine Agr. Expt. Sta. (1888), (1889a): sheep.

*Reindeermoss, dry*

Honcamp and Blanck (1918b): sheep.

Morgen, Beger, and Ohlmer (1916): sheep.

*Rhodesgrass hay*

Fraps (1916), (1919): sheep.

——— *fed green*

French (1941): sheep.

Work (1937): steers.

*Rhodesgrass Guineagrass grass mixed hay*

Louw (1938) prebloom: sheep.

## Rice hay

Fraps (1916): sheep.

—— *bran and hulls*

Honcamp and Pfaff (1924): sheep.

Goettingen Landw. Vers. Sta. (1900): sheep.

—— *hulls*

Fraps (1919), (1929): sheep.

French (1937f): sheep.

—— *straw*

Carbery, Chatterjee, and Hye (1934): steers.

Fraps (1912): sheep.

Kellner (1888): sheep.

Lander and Dharmani (1931): cows.

Warth (1928): steers.

—— *straw*

Carbery, Chatterjee, and Hye (1934): steers.

Iwata (1926): sheep.

—— *straw, treated with  $\text{Ca}(\text{OH})_2$ , dry*

Iwata (1926): sheep.

—— *straw, treated with  $\text{NaOH}$ , dry*

Iwata (1926): sheep.

—— *straw, boiled in water*

Iwata (1926): sheep.

—— *grain, rough*

Fraps (1916): sheep.

—— *polished, cooked*

Meissl, Strohmer, and Lorenz (1886): swine.

—— *bran*

Browne (1904): steers.

Rather (1917): swine.

—— *bran*

Emery (1899): sheep.

Fraps (1914), (1919), (1924), (1929): sheep. (1932): swine.

French (1937f): sheep.

Goettingen Landw. Vers. Sta. (1900): sheep.

Honcamp and Pfaff (1924): sheep.

Kellner (1886): sheep.

Lehmann and Vogel (1890): sheep.

—— *feed*

Honcamp and Pfaff (1924): sheep.

Kellner and Lepoutre (1907): sheep.

Kuehn, Gerdes, Koch, and Raab (1894): steers.

Lehmann and Vogel (1890): sheep.

—— *polishings*

Browne (1903), (1904): steers.

French (1937e): swine.

Rather (1917): swine.

*Rice polishings*

Fraps (1914), (1924), (1929): sheep. (1932): swine.  
French (1937f): sheep.

*Rocketsalad, dried*

Scharrer and Schreiber (1940d): sheep.

——— *fed green*

Scharrer and Schreiber (1940d): sheep.

——— *silage*

Scharrer and Schreiber (1940d): sheep.

*Rockweed, dry*

Ringen (1939): sheep, swine.  
Woehlbier and Windheuser (1939): sheep.

Rosewood leaves, fed green. *See Leaves, rosewood, fed green.*

*Rubber seed oil meal*

Auld (1913): sheep.

*Rumen contents, dried*

Honcamp, Nolte, and Blanck (1919): sheep.  
Morgen, Beger, Wagner, *et al.* (1917): sheep.

——— *molasses added, dried*

Morgen, Beger, Wagner, *et al.* (1917): sheep.

*Rush hay, saltmeadow*

Lindsey and Jones (1898): sheep.

*Rush, Baltic, grass mixed hay*

Knight, Hepner, and Morton (1906): sheep.

*Rush, slenderbreak, sedge grass legume mixed hay*

Dinsmore and Kennedy (1907): sheep.  
Knight, Hepner, and McConnel (1908): sheep.

*Russianthistle, tumbling, dry*

Cave, Riddell, and Hughes (1936): cows.  
Christensen and Hopper (1936): sheep.

*Rutabaga tops, dried*

Nehring and Schramm (1942): sheep.

——— *crowns and tops, dehydrated*

Honcamp, Gschwendner, and Muellner (1916): sheep.

——— *roots*

Guenther (1934): horses.  
Jordan (1891): sheep.  
Kirsch and Jantzon (1938d): swine.  
Lehmann and Vogel (1890): sheep.  
Lindsey, Beals, and Smith (1917): sheep.

——— *crowns and tops, fed green*

Kirsch and Jantzon (1940b): sheep.

——— *crowns and tops, fed green*

Honcamp, Gschwendner, and Muellner (1916): sheep.



**Rutabaga crown and top silage**

Kirsch and Jantzon (1940b): sheep.

**— crown and top silage**

Honcamp, Gschwendner, and Muellner (1916): sheep.

**— top silage**

Nehring and Schramm (1942): sheep.

**Rye straw**

Fingerling (1919a): sheep.

— and Schmidt (1919): sheep.

— and Schuster (1923): sheep.

Honcamp and Baumann (1921b): sheep.

— and Hilgert (1932): sheep.

Ries, and Muellner (1914): sheep.

Stutzer (1915b): sheep.

**— straw, boiled or steamed**

Fingerling (1919a): sheep.

Honcamp and Hilgert (1932): sheep.

**— straw, treated with  $\text{Ca}(\text{OH})_2$** 

Honcamp and Baumann (1921a): sheep.

**— straw, treated with  $\text{HCl}$ , dried**

Honcamp and Blanck (1919b): sheep.

Stutzer (1915a): sheep.

**— straw, treated with  $\text{NaOH}$** 

Fingerling (1919a): sheep.

— and Schmidt (1919): sheep, steers.

Honcamp and Baumann (1921b): sheep.

Voeltz (1920): sheep.

**— straw, treated with  $\text{Na}_2\text{S}$ , dried**

Fingerling (1919a): sheep.

**— straw, winter**

Honcamp and Baumann (1921a): sheep.

— and Blanck (1919b): sheep.

Nolte, and Pommer (1921): sheep.

Ries, and Muellner (1914): sheep.

**— straw, winter, treated with  $\text{NaHCO}_3$ , dried**

Honcamp and Baumann (1921b): sheep.

**— straw, winter, treated with  $\text{NaOH}$ , wet**

Honcamp, Nolte, and Pommer (1921): sheep.

**— fodder, fed green**

Frear, Caldwell, Holter, and Sweetser (1888): steers.

**— grain**

Honcamp, Neumann, and Muellner (1913): sheep, swine.

Knieriem (1900): sheep.

Lindsey, Smith, and Holland (1894): sheep.

Mangold and Stotz (1930): swine.

*Rye bran*

Honcamp and Nolte (1920): sheep.

——— and Pfaff (1925): sheep.

Nehring and Schramm (1939b): sheep, swine.

Scheunert, Klein, and Steuber (1925): sheep.

——— *distillers' dried grains*

Honcamp and Gschwendner (1911): sheep.

Kellner, Koehler, Barnstein, and Hartsung (1898): sheep.

Patterson and White (1912): steers.

——— *feed*

Honcamp, Neumann, and Muellner (1913): sheep, swine.

——— and Nolte (1920): sheep.

——— and Pfaff (1925): sheep.

Koehler, Honcamp, Just, *et al.* (1903): sheep.

Kuehn, Koenig, and Boettcher (1894): steers.

Scheunert, Klein, and Steuber (1925): sheep.

——— *feed flour, low-grade*

Honcamp, Neumann, and Muellner (1913): sheep, swine.

Kellner, Just, Honcamp, *et al.* (1907): sheep.

——— *flour middlings*

Honcamp, Neumann, and Muellner (1913): sheep, swine.

——— *germ meal*

Honcamp, Neumann, and Muellner (1913): sheep, swine.

——— and Pfaff (1925): sheep.

Nehring and Schramm (1939b): sheep, swine.

Scheunert, Klein, and Steuber (1925): sheep.

——— *middlings*

Honcamp and Nolte (1920): sheep.

——— and Pfaff (1925): sheep.

Kellner and Koehler (1898): steers.

Koehler, Honcamp, Just, *et al.* (1903): sheep.

Scheunert, Klein, and Steuber (1925): sheep.

*Ryegrass hay*

Eskedal (1934): cows.

Steuber and Stotz (1931): sheep.

Volhard (1908): sheep.

*Ryegrass hay, Italian*

Gregoire and Corpiaux (1914) prebloom: sheep.

Honcamp, Stau, and Muellner (1915): sheep.

Senior and Sheehy (1941) early bloom: sheep.

*Ryegrass hay, perennial*

Gregoire and Corpiaux (1914) prebloom, full bloom: sheep.

Hagemann (1909): sheep.

Honcamp, Stau, and Muellner (1915) early bloom: sheep.

Kirsch, Wenck, and Jantzon (1936) prebloom: sheep.

*Ryegrass straw*

Adams and Garrett (1940): sheep.

——— *fed green*

Eskedal (1934): cows.

Ryegrass, Italian, fed green  
Senior and Sheehy (1941): sheep.

Ryegrass sainfoin mixed hay  
Woodman and Calton (1928): sheep.

*Sacahuista hay*  
Fraps (1922): sheep.

*Safflower fodder, fed green*  
Scharrer and Schreiber (1940a): sheep.

——— *silage*  
Scharrer and Schreiber (1940a): sheep.

——— *oil meal*  
Honcamp, Eichler, Helms, and Reinmuth (1929): sheep.  
Scharrer and Schreiber (1942d): sheep.

*Sagopalm pith meal, smooth*  
Woodman, Menzies Kitchin, and Evans (1931): swine.

Sainfoin hay, common  
Weiske, Wildt, Potts, *et al.* (1877): sheep.

——— fodder, common, fed green  
Weiske, Wildt, Potts, *et al.* (1877): sheep.

——— silage, common  
Weiske, Wildt, Potts, *et al.* (1877): sheep.

Saltbush, Australian, dry  
Headden (1929): sheep.

Saltbush, silvery, dry  
Headden (1904): sheep.

Saltbush, fourwing, fed green  
Brown (1922): cows.

Saltgrass hay, seashore  
Lindsey and Jones (1898): sheep.

Sandbur hay, India  
Lander and Dharmani (1932): cows.

Sandbur grass, fed green  
French (1941): sheep.

Satintail grass, Brazil, very immature, dried  
Kellner (1886): sheep.

Sawdust. *See Wood sawdust, dry.*

*Screenings, grain*  
Patterson and White (1912): steers.

Sedge hay  
Voeltz, Reisch, Kirsch, *et al.* (1928): sheep.

**Serradella hay**

Honcamp (1923a): sheep.

Weiske, Kennepohl, and Schulze (1882): sheep.

**Sesame oil meal**

Folger (1934): sheep.

Fraps (1922): sheep.

French (1933a): sheep.

Honcamp and Gschwendner (1911): sheep.

Wolff, Funke, and Kreuzhage (1882): sheep.

**Sheepbush, Australian, dry**

Botha (1938): sheep.

**Sheepbush, ballhead, dry**

Botha (1938): sheep.

**Silvergrass, Chinese, field horsetail mixed hay**

Kellner (1888): sheep.

**Silvergrass, Chinese, bush lespedeza mixed hay**

Kellner (1888): sheep.

**Skimmilk. See milk, skimmed.****Skin meal**

Nehring and Malkomesius (1938): swine.

**Skin and dried "stick" meal**Morgen, Beger, Wagner, *et al.* (1917): sheep.**Sloughgrass hay, Old World**

Voeltz (1928): sheep.

**—— hay, Old World**

Voeltz (1928): sheep.

**Soapweed stems, dry**

Fraps (1919): sheep.

**—— fodder**

Brown (1922): cows.

**Soapweed hay, small**

Fraps (1919), (1922): sheep.

**Sorghum fodder, dry**

Fraps (1916) dough stage: sheep.

Headden (1904): sheep.

**—— fodder, feterita, dry**

Fraps (1916): sheep.

**—— fodder, kafir, dry**

Fraps (1912) late bloom (1916): sheep.

Holter and Fields (1899) mature: steers

**—— fodder, milo, dry**

Fraps (1916): sheep.

**Sorghum fodder, shallu, dry**

Fraps (1916): sheep.

**— fodder, sorgho or sweet, dry**

Fraps (1912) dough stage (1914), (1916): sheep.

Shepard and Kock (1909): sheep.

**— Sudangrass hay**

Dowell and Friedemann (1920): sheep.

Fraps (1916) half bloom, full bloom: sheep.

Gaessler and McCandlish (1918) full bloom: cows.

Lindsey, Beals, and Smith (1917) prebloom, full bloom (also immature dried): sheep.

Schmitz (1916) post bloom: steers.

**— *Sudangrass hay***

Lindsey, Beals, and Smith (1917) prebloom: sheep.

**— Sudangrass hay, dehydrated**

Newlander (1935a) prebloom (1935b): cows.

**— bagasse**

Emery and Kilgore (1894): goats.

**— head stems, kafir, dry**

Fraps (1924): sheep.

**— stover, kafir, dry**

Holter and Fields (1899): steers.

Willard and Clothier (1901): steers.

**— stover, milo, dry**

Fraps (1916): sheep.

**— leaves, dry**

Emery and Kilgore (1894) dough stage: cows, goats.

**— straw, Sudangrass**

Fraps (1916): sheep.

**— fodder, juar, fed green, India**

Lander and Dharmani (1936) late bloom, mature: cows, steers.

Schneider, Brooks, Joshi, *et al.* (1939): cows.

**— fodder, sorgho or sweet, fed green**

Armsby, Frear, Caldwell, and Holter (1889): sheep.

Harrington, Adriance, and Tilson (1890) dough stage: cows.

Lindsey, Holland, and Smith (1907) early bloom: sheep.

**— fodder, Sudangrass, fed green**

Lander and Dharmani (1936) dough stage: cows.

Richter and Herbst (1937) immature: sheep.

**— fodder, *Sudangrass*, fed green**

Lindsey, Beals, and Smith (1917) prebloom: sheep.

**— mill refuse**

McCandlish (1920a): cows.

**— silage, broomcorn**

Dowell and Friedemann (1921): sheep.

Sorghum silage, darso

Dowell and Friedemann (1920): sheep.

— silage, sorgho or sweet

Bechtel, Atkeson, and Hughes (1943) dough stage: cows.

Fraps (1916): sheep.

— silage, Sudangrass

Richter and Herbst (1937): sheep.

— grain

Honcamp, Goettsch, Gschwendner, *et al.* (1912): sheep.

— grain, broomcorn

Tangl, Weiser, and Zaitschek (1905): swine.

— grain, broomcorn

Dowell and Friedemann (1920): sheep.

Fraps (1929): sheep.

Tangl, Weiser, and Zaitschek (1905): steers, sheep, swine, horses.

— grain, darso

Dowell and Friedemann (1920): sheep.

Fraps (1922): sheep.

— grain, durra

Bondi and Meyer (1940): sheep.

Wolff, Sieglin, Kreuzhage, *et al.* (1890): sheep.

— grain, feterita

Fraps (1916): sheep.

Lindsey, Beals, and Smith (1917): sheep.

— — — — — and Archibald (1923): sheep.

— grain, kafir

Rather (1917): swine.

— grain, kafir

Fraps (1908): steers. (1914): sheep.

Holter and Fields (1899): steers.

Willard and Clothier (1901): steers.

— grain, milo

Fraps (1932): swine.

— grain, milo

Christensen, Simpson, and Foster (1916): steers.

Fraps (1908): steers. (1922), (1929): sheep.

— grain, sorgho or sweet

Fraps (1922): sheep.

— head chops, kafir

Fraps (1914): sheep.

Holter and Fields (1899): steers.

— head chops, milo

Fraps (1916): sheep.

**Soybean hay**

- Emery and Kilgore (1894) late bloom: cows, goats.  
Forbes, Braman, Kriss, *et al.* (1927): steers.  
Hamilton, Mitchell, and Kammlade (1928): sheep.  
Kellner (1886) dough stage (1888) full bloom: sheep.  
Morrow and LaMaster (1929): cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) dough stage (1940) dough stage: cows.  
Ritzman and Benedict (1938): cows.  
Snell (1934): steers.

**— hay**

- Lindsey, Beals, and Smith (1917): sheep.

**— hay, dehydrated**

- Newlander (1935b): cows.  
— Ellenberger, Camburn, and Jones (1938) dough stage (1940) dough stage: cows.  
Snell (1934): steers.

**— hay meal**

- Morrow and LaMaster (1929): cows.

**— pods, dry**

- Weiske, Dehmel, and Schulze (1879): sheep.

**— straw**

- Hamilton, Mitchell, and Kammlade (1928): sheep.  
Scharrer and Nebelsiek (1938b): sheep.  
Weiske, Dehmel, and Schulze (1879): sheep.  
— Kennepohl, and Schulze (1883): sheep.

**— straw meal**

- Scharrer and Nebelsiek (1938b): sheep.

**— fodder, fed green**

- Axtmayer, Hernandez, and Cook (1938) full bloom, dough stage: sheep.  
Phelps (1898) milk stage: sheep.  
— and Bryant (1896) half bloom, late bloom: sheep.  
— and Woods (1895) late bloom, milk stage: sheep.

**— fodder, fed green**

- Lindsey (1905): sheep.  
— Holland, and Smith (1907) dough stage: sheep.

**— silage**

- Emery and Kilgore (1892): goats.  
Hopkins (1896): steers.  
Newlander, Ellenberger, Camburn, and Jones (1938), (1940) dough stage: cows.

**— silage, sun-wilted**

- Newlander, Ellenberger, Camburn, and Jones (1938), (1940) dough stage: cows.

**— silage, molasses added**

- Newlander, Ellenberger, Camburn, and Jones (1938), (1940) dough stage: cows.



*Soybean silage, molasses added*

Forbes, Bratzler, and French (1940) dough stage: steers.

— Swift, Bratzler, et al. (1943): steers.

— *silage, sun-wilted, molasses added*

Newlander, Ellenberger, Camburn, and Jones (1938), (1940) dough stage: cows.

— *silage,  $H_3PO_4$  added*

Newlander, Ellenberger, Camburn, and Jones (1940) dough stage: cows.

— *silage,  $H_3PO_4$  added*

Forbes, Bratzler, and French (1940) dough stage: steers.

— *seed*

Forbes, Beegle, Fritz, and Mensching (1914): swine.

Hamilton, Mitchell, and Kammlade (1928): sheep.

Kellner (1886): sheep.

Lindsey (1904), (1905): sheep.

— Smith, and Holland (1894): sheep.

Scharrer and Nebelsiek (1938c): sheep.

Willard and Clothier (1901): steers.

— *seed, steamed*

Scharrer and Nebelsiek (1938c): sheep.

— *oil meal, hydraulic or expeller process*

Hamilton, Mitchell, and Kammlade (1928): sheep.

— *oil meal, hydraulic or expeller process*

Andersen and Winther (1934): cows.

Eskedal (1934): cows.

Forbes, Bratzler, and French (1940): steers.

Hamilton, Mitchell, and Kammlade (1928): sheep.

Honcamp (1910): sheep.

— and Pfaff (1924): sheep.

Swanson and Herman (1943): cows.

Watson, Woodward, Davidson, et al. (1936): steers.

— *oil meal, solvent process*

Christ (1934): goats.

Fingerling and Honcamp (1934): sheep, swine.

Forbes, Bratzler, and French (1940): steers.

Haberhauffe (1927): swine.

Honcamp (1910): sheep.

— Helms, Malkomesius, et al. (1935): sheep, swine.

Kellner and Neumann (1910): swine.

Lenkeit and Schleinitz (1940): goats.

Malkomesius and Schramm (1930): sheep.

Watson, Campbell, Davidson, et al. (1942): steers.

*Soybean sorghum mixed silage*

Forbes, Swift, Bratzler, et al. (1943): steers.

*Spelt straw*

Fingerling (1905): sheep.

Honcamp, Ries, and Mueller (1914): sheep.

Wolff, Sieglin, Kreuzhage, and Mehlis (1887): horses.

*Spelt straw pulp*

Fingerling (1905): sheep.

*Sphagnum moss, molasses added, dry*

Lindsey and Smith (1914): sheep.

*Starch*

Armsby and Fries (1918) (*corn starch*): steers.

Fingerling (1932) (*potato starch*): swine.

——— Koehler, Reinhardt, *et al.* (1914) (*potato starch*): swine.

Wicke and Weiske (1896b): sheep.

*Stickleback fish meal. See Fish meal, stickleback.**Sugar, cane*

Fingerling, Koehler, Reinhardt, *et al.* (1914): swine.

*——— feeding*

Fingerling, Just, Eisenkolbe, *et al.* (1936): steers.

Hoetzel (1934): horses.

*——— wood*

Fingerling, Just, Eisenkolbe, *et al.* (1936): steers.

Honcamp, Hilgert, and Woehlbier (1932): sheep, swine.

Woehlbier and Schramm (1936b): sheep, swine.

*Sugar yeast mixture*

Mangold, Columbus, and Peham (1941): swine.

*Sugarcane bagasse, sifted*

Work (1937): steers.

*Sugarcane, fed green*

Harrison (1942): cows.

*——— tops, fed green*

Harrison (1942): cows.

Work (1938): steers.

*Sulfite waste liquors dried*

Goy (1913): sheep.

*Sunflower fodder, fed green*

Bondi and Meyer (1940): sheep.

Isaachsen and Ulvesli (1929a) early bloom, half bloom: sheep.

Lander and Dharmani (1936): cows.

*——— fodder, fed green*

Isaachsen and Ulvesli (1929b): sheep.

*——— silage*

Christensen and Hopper (1938): steers, sheep.

Dowell and Friedemann (1920): sheep.

Joseph and Blish (1920): steers.

Kirsch and Jantzon (1933), (1934), (1935a): sheep.

Neidig, Snyder, and Hickman (1921): cows, sheep.

Nevens (1924): cows.

Sotola (1921): sheep.

*Sunflower silage*

- Christensen and Hopper (1938): steers.  
Isaachsen and Ulvesli (1929a): sheep.  
Joseph and Blish (1920): steers.  
Kirsch and Jantzon (1930), (1932a): sheep.  
Koukl and Jirasek (1938): sheep.  
Scharrer and Schreiber (1940e): sheep.

——— *seed oil meal, with hulls*

- Andersen and Winther (1934): cows.  
Eskedal (1934): cows.  
Honcamp, Mueller, and Pfaff (1924): sheep.

——— *seed oil meal, hulls removed*

- Andersen and Winther (1934): cows.  
Eskedal (1934): cows.  
Honcamp and Gschwendner (1911): sheep.  
Wolff, Funke, and Kreuzhage (1882): sheep.

*Sunflower fodder, Jerusalem-artichoke, dry*

- Luske (1934): sheep.  
Voeltz, Baudrexel, and Deutschland (1914): sheep.

——— *tubers, Jerusalem-artichoke*

- Muentz and Girard (1884b): horses.

——— *top silage, Jerusalem-artichoke*

- Kirsch and Jantzon (1934): sheep.

Swamp hay. *See* Marsh hay.

*Sweetclover hay*

- Christensen and Hopper (1938): sheep.  
Knight, Hepner, and McConnel (1908): sheep.  
Sotola (1940b) prebloom: sheep.

*Sweetclover, annual yellow, fed green*

- Lander and Dharmani (1936): cows.

*Sweetclover, white, fed green*

- Lindsey, Beals, and Smith (1917) prebloom, early bloom: sheep.

*Sweetclover silage*

- Christensen and Hopper (1938) prebloom, early bloom, full bloom: steers, sheep.

*Sweetclover oat straw mixed silage*

- Christensen and Hopper (1938): sheep.

*Sweetclover wheat mixed hay*

- Sotola (1936): sheep.

*Sweetclover wheat fodder mixed silage*

- Sotola (1936): sheep.

*Sweetgrass hay*

- Hoenigschmid and Liebscher (1936): sheep.

*Sweetpotato vines, dried*

- Katayama (1914): sheep.

**Sweetpotato vines, fed green**

Harrison (1942): cows.

—— *vine silage*

Katayama (1914): sheep.

**Tanglehead hay**

Lander and Dharmani (1928): cows.

**Tankage**

Buelow (1900): sheep.

Dietrich and Grindley (1914): swine.

Forbes, Beegle, Fritz, and Mensching (1914): swine.

French (1935a): swine.

Honcamp, Eichler, Sachsse, and Schulz (1932): swine.

Kuehn, Gerver, Kisielinski, and Schmidt (1894): steers.

—— Thomas, and Struve (1894): steers.

Morgen, Wagner, Schoeler, and Ohlmer (1919): sheep.

Wildt (1877a): sheep.

Wolff, Funke, and Dittmann (1879): swine.

Woodman and Evans (1937): swine.

—— *glue or "stick"*

Morgen, Beger, Wagner, *et al.* (1919): sheep.

—— *with horn meal*

Morgen, Beger, Wagner, *et al.* (1919): sheep.

—— Wagner, Schoeler, and Ohlmer (1919): sheep.

—— *absorbed on treated sawdust, dried*

Morgen, Beger, Wagner, *et al.* (1919): sheep.

—— *absorbed on speltz-chaff, dried*

Honcamp, Nolte, and Blanck (1919): sheep.

**Tapioca flour**

Woodman, Menzies Kitchin, and Evans (1931): swine.

**Teff hay**

Ross and Bosman (1927): sheep.

—— and Van Wyk (1931): steers.

—— *grass, fed green*

Bondi and Meyer (1940): sheep.

**Tetragonia, bush, fed green**

Botha (1938): sheep.

**Tillandsia, treebeard (or Spanish moss), dry**

Fraps (1919): sheep.

**Timothy hay**

Armsby (1898): steers.

—— and Fries (1911), (1915): steers.

Bartlett (1904): steers, sheep.

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom, late bloom  
(1944) half bloom, full bloom, post bloom: cows.

Cutter (1892): steers.

## Timothy hay, continued

- Emery and Kilgore (1898): sheep.  
Eskedal (1934): cows.  
Forbes, Swift, Bratzler, *et al.* (1943): steers.  
Headden (1904) early bloom: sheep.  
Honcamp, Stau, and Muellner (1915) early bloom: sheep.  
Isaachsen, Ulvesli, and Husby (1935) prebloom, late bloom: sheep.  
Jordan (1887) post bloom (1890) full bloom, overripe (1891): sheep.  
Lathrop and Bohstedt (1938): cows, sheep.  
Lindsey, Beals, and Archibald (1926): horses.  
Maine Agr. Expt. Sta. (1888) late bloom, full bloom (1889a) early bloom, late bloom: sheep.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom (1940) early bloom: cows.  
Patterson (1897) full bloom: horses.  
Poiijaervi (1934) prebloom, half bloom, post bloom: sheep.  
Risser (1904): sheep.  
Ritzman and Benedict (1938): cows.  
Voeltz (1928): sheep.  
—— Paechtnr, and Baudrexel (1912): sheep.  
Waters (1915) early bloom, full bloom, post bloom, mature: steers.  
Watson and Ferguson (1937b) post bloom: sheep.  
Widstoe (1898): steers.

## —— hay

- Armsby and Fries (1915): steers.  
Emery and Kilgore (1898): sheep.  
Forbes, Braman, Kriss, *et al.* (1933): steers.  
—— Swift, Bratzler, *et al.* (1943): steers.  
Mitchell, Kammlade, and Hamilton (1928): sheep.  
Voeltz (1928): sheep.

## —— hay, dehydrated

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom, late bloom (1944) full bloom, post bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom (1940): cows.

## —— meal

- Lathrop and Bohstedt (1938): cows, sheep.

## —— fed green

- Cutter (1892): steers.  
Eskedal (1934): cows.  
Harcourt (1897) prebloom, late bloom, post bloom: sheep.

## —— silage

- Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom (1940) early bloom: cows.

## —— silage, sun-wilted

- Camburn, Ellenberger, Jones, and Crooks (1942) early bloom (1944) full bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom (1940) early bloom: cows.

## —— silage, A.I.V.

- Camburn, Ellenberger, Jones, and Crooks (1944) half bloom: cows.  
Newlander, Ellenberger, Camburn, and Jones (1940) early bloom: cows.

**Timothy silage, molasses added**

Camburn, Ellenberger, Jones, and Crooks (1942) early bloom (1944) full bloom: cows.

Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom, late bloom (1940) early bloom: cows.

**— silage, sun-wilted, molasses added**

Camburn, Ellenberger, Jones, and Crooks (1942) late bloom (1944) half bloom, full bloom: cows.

Newlander, Ellenberger, Camburn, and Jones (1938) prebloom, full bloom (1940) early bloom: cows.

**— silage,  $H_3PO_4$  added**

Camburn, Ellenberger, Jones, and Crooks (1942) late bloom (1944) full bloom, post bloom: cows.

Newlander, Ellenberger, Camburn, and Jones (1940) early bloom: cows.

**Timothy seed, wild**

Kirsch (1938): sheep.

**Timothy grass weeds mixed hay**

Armsby (1898): steers.

Bartlett (1897), (1900): sheep. (1904): steers, sheep.

Benedict and Ritzman (1923): steers.

Honcamp, Stau, and Muellner (1915): sheep.

Isaachsen, Ulvesli, and Husby (1935) prebloom, late bloom: sheep.

Jordan (1894): sheep.

Newlander, Ellenberger, and Jones (1942) full bloom: cows.

Poiijaervi (1934) half bloom, post bloom: sheep.

**— mixed hay, 2d or 3d cutting**

Isaachsen, Ulvesli, and Husby (1935) early bloom: sheep.

Newlander, Ellenberger, and Jones (1942) full bloom: cows.

Phelps and Woods (1894): sheep.

**Timothy grass mixed silage, molasses added**

Newlander, Ellenberger, and Jones (1942) half bloom: cows.

**Tobosa hay**

Fraps (1914): sheep.

**Tobosa vine-mesquite mixed hay**

Watkins (1933): steers.

**Trefoil hay, birdsfoot**

Hagemann (1909): sheep.

**Tripteris fodder, thickwing, dry**

Botha (1938): sheep.

**Tuna fish meal. *See Fish meal, tuna.*****Turnip tops, dried**

Nehring and Schramm (1942): sheep.

**Turnips, roots**

Isaachsen and Ulvesli (1929b): sheep.

Kirsch and Jantzon (1938d): swine.

Voeltz, Jantzon, and Reih (1923): sheep.

*Turnips, roots, English flat*

Jordan (1891): sheep.

*Turnip tops, fed green*

Isaachsen and Ulvesli (1929b): sheep.

——— *top silage*

Isaachsen and Ulvesli (1929b): sheep.

*Twigs, acacia, dry*

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

——— *beech, dry*

Goettingen Landw. Vers. Sta. (1900): sheep.

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

Lehmann (1895): sheep.

——— *poplar, dry*

Guenther, Heinemann, Lindsey, and Lehmann (1893): sheep.

*Urea*

Voeltz, Jantzon, and Reih (1923): sheep.

*Vegetable ivory meal. See Ivorynut meal.**Velvetbean hay*

French (1935c), (1937b): sheep.

Miller (1902): steers.

——— *vines, fed green*

Axtmayer, Hernandez, and Cook (1938) full bloom, dough stage: sheep.

Harrison (1942): cows.

Lander and Dharmani (1936) dough stage: steers.

Miller (1902): steers.

——— *seed*

Ewing and Smith (1918): steers.

——— *seed*

French (1938d): sheep.

——— *seeds and pods*

Fraps (1922): sheep.

Lindsey (1919): horses.

——— Beals, Smith, and Archibald (1923): sheep.

*Vetch, bitter, fed green*

Bondi and Meyer (1940) early bloom: sheep.

*Vetch hay, common*

Bondi and Meyer (1940): sheep.

Fraps (1912): sheep.

Groh and Gaetz (1916): sheep.

Voeltz, Jantzon, and Korsch (1927a) early bloom, full bloom: sheep.

Withycombe and Bradley (1908): cows.

——— and Knisely (1905) overripe: cows.

Wolff, Funke, and Kreuzhage (1879a) early bloom: sheep.

——— *hay, common*

Gabriel and Gottwald (1887): sheep.



Vetch, common, fed green

Bondi and Meyer (1940) prebloom: sheep.

Hutchinson (1895): sheep.

Vetch hay, hairy

Dinsmore (1908): sheep.

Hutchinson (1895): sheep.

—— fed green

Hutchinson (1895): sheep.

Vetch, Narbonne, fed green

Bondi and Meyer (1940): sheep.

Vetch silage

Withycombe and Bradley (1908): cows.

—— silage, steamed

Withycombe and Bradley (1908): cows.

Vetch seed, black bitter

Bondi and Meyer (1940): sheep.

Vetch grass mixed hay

Gabriel and Gottwald (1887): sheep.

—— mixed hay, dehydrated

Lenkeit and Becker (1938): sheep.

Vetch, hairy, winter wheat mixed hay

Lindsey (1903): goats.

—— mixed fodder, fed green

Lindsey (1903) prebloom: goats.

Vetch mixture silage

Schnepf (1936): sheep.

Vinegar dried grains. *See Yeast dried grains.*

Walnut meal, hulls removed

Honcamp, Zimmermann, and Blanck (1919): sheep.

—— meal, with hulls

Honcamp, Zimmermann, and Blanck (1919): sheep.

Watergrass hay

Vinson (1911): sheep.

Whale bone meal

Honcamp, Eichler, Sachsse, and Schulz (1932): swine.

Whale meal

Honcamp, Gschwendner, and Engberding (1911): sheep.

Kirsch and Jantzson (1941): swine.

Schramm (1936): swine.

Woehlbier and Schramm (1936c): sheep, swine.

—— meat and bone meal

Honcamp, Eichler, Sachsse, and Schulz (1932): sheep, swine.

## Wheat hay

Sotola (1937): sheep.

— *chaff*

Fingerling, Bretsch, Loesche, and Arndt (1914): sheep, swine.

Lehmann (1895): sheep.

— *straw*

Lander and Dharmani (1924), (1927): steers. (1932), (1936): cows.

Muentz (1880): horses.

Watkins (1929), (1931): steers.

Wolff, Funke, Kreuzhage, and Kellner (1879a): sheep.

— *straw*

Honcamp, Ries, and Muellner (1914): sheep.

Lehmann (1895): sheep.

Voeltz, Paechtner, Baudrexel, et al. (1913): sheep.

Wolff, Funke, Kreuzhage, and Kellner (1879a): horses.

— *straw, winter*

Sotola (1933a): sheep.

— *straw, winter*

Honcamp, Ries, and Muellner (1914): sheep.

Popoff (1928): sheep.

Thomann (1921): sheep.

Weiser and Zaitschek (1920): sheep, horses.

Wolff, Funke, Kreuzhage, and Kellner (1877): horses.

— *straw, winter, treated with NaOH, dry*

Thomann (1921): sheep.

Weiser and Zaitschek (1920): sheep, horses.

— *straw, winter, steamed*

Weiser and Zaitschek (1920): sheep, horses.

— *grain*

Watson, Campbell, Davidson, et al. (1943): swine.

— *grain*

Christensen and Hopper (1936): sheep.

Fraps (1922), (1929): sheep.

French (1935a): swine.

Honcamp, Neumann, and Muellner (1913): sheep, swine.

Lindsey, Holland, and Smith (1907): sheep.

Shepard and Kock (1909): sheep.

Snyder (1894): swine.

— *bran*

Gamble (1906): steers.

— and Day (1908): steers.

Muentz (1880): horses.

Patterson (1896): steers.

— *bran*

Andersen and Winther (1934): cows.

Armsby and Fries (1911), (1915): steers.

Bartlett (1889): sheep. (1904): steers, sheep.

Buelow (1900): sheep.

Diakow, Prokofiew, Knjaginitchew, et al. (1929): sheep.

*Wheat bran, continued*

- Eskedal (1934): cows.  
Fraps (1922), (1929): sheep. (1932): swine.  
French (1935a): swine. (1938e): steers, sheep.  
Haberhauffe (1927): swine.  
Honcamp, Neumann, and Muellner (1913): sheep, swine.  
——— and Nolte (1920): sheep.  
Jordan (1891): sheep.  
Koehler, Honcamp, Just, *et al.* (1903): sheep.  
Kuehn, Gerver, Kelbe, and Schmoeger (1876): steers.  
——— Schmoeger, *et al.* (1883): steers.  
Lenkeit and Schleinitz (1940): goats.  
Lindsey (1893): sheep.  
——— Beals, and Archibald (1926): horses.  
——— Smith, and Holland (1894): sheep.  
Rather (1917): swine.  
Schulze and Maercker (1875): sheep.  
Snyder (1893): swine.  
Watson, Campbell, Davidson, *et al.* (1942): steers.  
Widstoe (1898): steers.  
Woodman (1923): sheep.

——— *bran and screenings*

- Bartlett (1900): sheep.

——— *bran, molasses and urea added*

- Nehring and Schramm (1937a): sheep.

——— *brown shorts*

- Fraps (1922), (1929): sheep.

——— *flour middlings*

- Grindley, Carmichael, and Newlin (1917): swine

——— *flour middlings*

- Bartlett (1889): sheep.  
Grindley, Carmichael, and Newlin (1917): swine  
Honcamp, Neumann, and Muellner (1913): sheep, swine.  
Lindsey (1893): sheep.  
Watson, Campbell, Davidson, *et al.* (1943): swine.

——— *germ oil meal*

- Honcamp, Neumann, and Muellner (1913): sheep, swine.  
Lenkeit, Schleinitz, and Lagneau (1940): sheep, swine.

——— *gluten feed*

- Schulze and Maercker (1875): sheep.

——— *gray shorts*

- Fraps (1932): swine.  
Rather (1917): swine.

——— *gray shorts*

- Fraps (1922), (1929): sheep.

——— *mixed feed*

- Bartlett (1904): steers.  
Honcamp and Nolte (1920): sheep.

*Wheat red dog*

- Diakow, Prokofiew, Knjaginitchew, *et al.* (1929): sheep.  
Dietrich and Grindley (1914): swine.  
Honcamp, Neumann, and Muellner (1913): sheep, swine.

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*screenings*

- Crampton and Whiting (1943): swine.  
Lindsey and Smith (1914): sheep.  
Platikanoff and Popoff (1937): sheep.

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*standard middlings*

- Watson, Campbell, Davidson, *et al.* (1943): swine.  
Woodman and Evans (1942), (1943b): swine.

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*standard middlings*

- Dietrich and Grindley (1914): swine.  
Forbes, Beegle, Fritz, and Mensching (1914): swine.  
Honcamp, Neumann, and Muellner (1913): sheep, swine.  
Snyder (1893): swine.  
Woodman (1925a): swine.

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*white shorts*

- Fraps (1916), (1922): sheep.

*Wheatgrass hay*

- Knight, Hepner, and McConnel (1908): sheep.

*Wheatgrass hay, bearded bluebunch*

- McCall (1940): sheep.

*Wheatgrass hay, bluestem*

- Knight, Hepner, and Morton (1906): sheep.  
Shepard and Kock (1909): sheep.

*Wheatgrass hay, crested, or immature, dried*

- McCall, Clark, and Patton (1943): sheep.  
Sotola (1940a) (also immature, dried): sheep.

*Wheatgrass hay, slender*

- Headden (1904): sheep.

*Wheatgrass, beardless bluebunch, fed green*

- Burkitt (1940): sheep.

*Wheatgrass, crested, immature, fed green*

- Sotola (1940a): sheep.

*Whey-protein*

- Lenkeit, Becker, and Lagneau (1938): swine.

*White fish meal. See Fish meal, white.**Willow leaves. See Leaves, willow, dry.**Willows, fed green*

- Dinsmore (1908): sheep.

*Wood cellulose, treated with NaOH, dry*

- Fingerling (1919b): sheep.

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*treated with Na<sub>2</sub>S, dry*

- Edin (1918): goats.  
Fingerling (1919b): sheep.

*Wood sawdust, dry*

- Honcamp, Gschwendner, Muellner, and Reich (1912): sheep.  
Lehmann (1895): sheep.  
Pfeiffer and Einecke (1905): sheep.

——— *treated with HCl, dry*

- Archibald (1926): sheep.

——— *residue after treatment with HCl, dry*

- Archibald (1926): sheep.

——— *treated with NaOH, dry*

- Mangold, Brueggemann, and Theel (1933): sheep.

——— *treated with H<sub>2</sub>SO<sub>4</sub>, dry*

- Honcamp, Gschwendner, Muellner, and Reich (1912): sheep.

——— *treated with H<sub>2</sub>SO<sub>4</sub>, molasses added, dry*

- Honcamp, Gschwendner, Muellner, and Reich (1912): sheep.

*Wood sugar. See Sugar, wood.**Wyethia fodder, woolly, dry*

- Kennedy and Dinsmore (1909): sheep.

*Yeast, boiled, pressed*

- Nehring and Schramm (1941): swine.

——— *dried*

- Crowther and Woodman (1917b): sheep.  
Fingerling and Honcamp (1934): sheep, swine.  
——— Schmidt, and Hientzsch (1934): steers, swine.  
Honcamp (1920): sheep, swine.  
——— Popp, and Volhard (1906): sheep.  
Mangold, Columbus, and Peham (1941): swine.  
Nehring and Schramm (1939c): swine.  
Voeltz, Muhr, Baumann, and Drauzburg (1914): sheep, swine.  
——— Paechtner, and Baudrexel (1912): sheep.

——— *wet*

- Mangold, Columbus, and Peham (1941): swine, horses.  
Nehring and Schramm (1939c), (1941): swine.

*Yeast, mineral*

- Voeltz (1919), (1920): sheep.

*Yeast, sulfite waste liquors, dried*

- Richter and Ehinger (1938): sheep, swine.  
——— and Gafert (1941): sheep, swine.

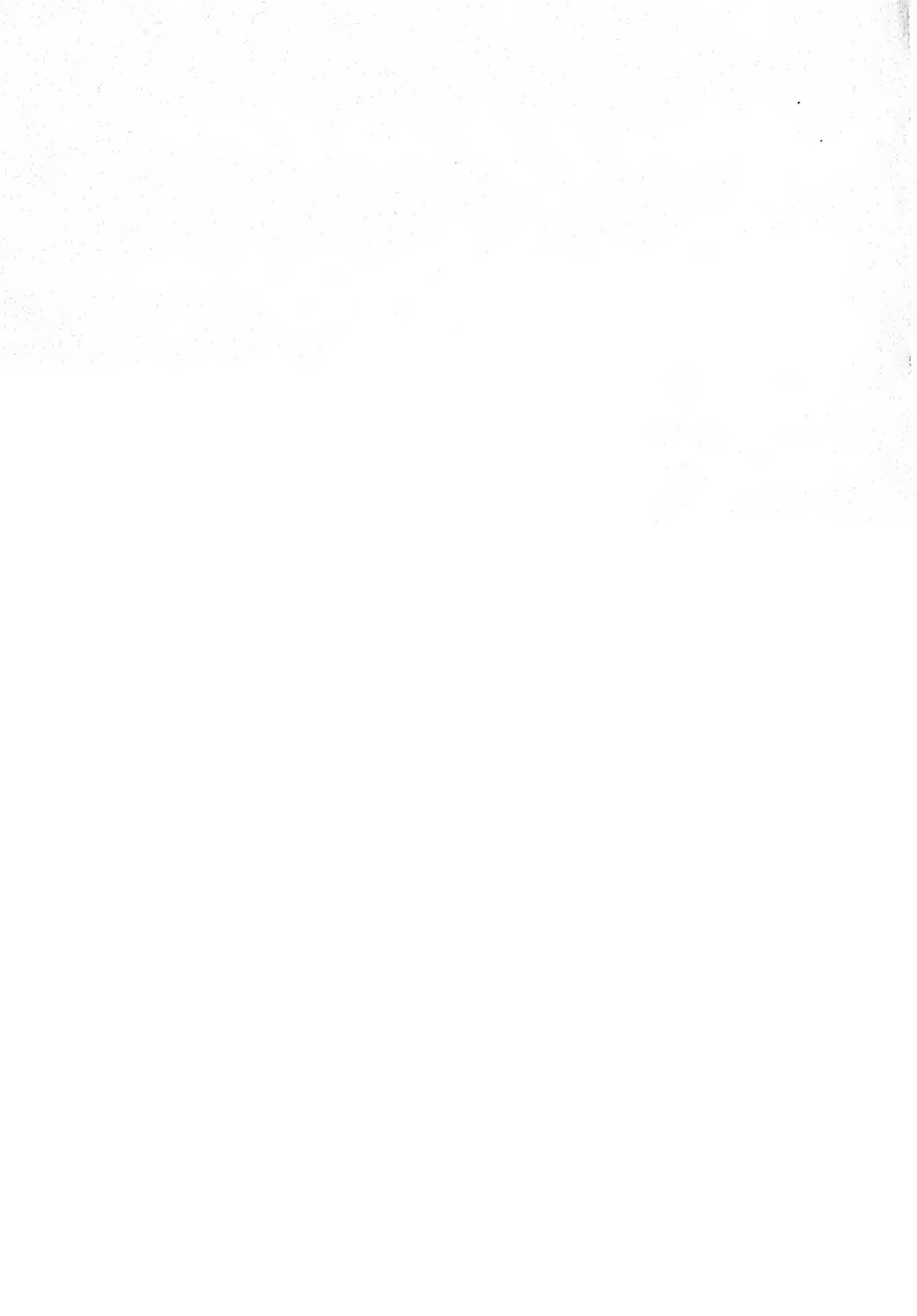
——— *wood sugar*

- Ehrenberg and Nietsch (1936): horses.  
Fingerling and Honcamp (1934): sheep, swine.  
——— Schmidt, and Hientzsch (1934): steers, swine.  
Richter and Brueggemann (1937a): sheep, swine.

*Yeast dried grains*

- Lindsey, Beals, and Smith (1917): sheep.

*Yeast sugar mixture. See Sugar yeast mixture.*



## SECTION III

### COMMON AND SCIENTIFIC NAMES

### OF PLANT AND ANIMAL SOURCES

### OF FEEDING STUFFS

<i>Abies</i> spp.....	Fir
<i>Acacia</i> .....	<i>Acacia</i> spp.
<i>Acacia</i> spp.....	<i>Acacia</i>
<i>Aesculus hippocastanum</i> .....	Horsechestnut
<i>Agropyron cristatum</i> .....	Wheatgrass, crested
<i>Agropyron inerme</i> .....	Wheatgrass, beardless bluebunch
<i>Agropyron repens</i> .....	Quackgrass
<i>Agropyron smithi</i> .....	Wheatgrass, bluestem
<i>Agropyron spicatum</i> .....	Wheatgrass, bearded bluebunch
<i>Agropyron trachycalum</i> (= <i>A pauciflorum</i> ).....	Wheatgrass, slender
<i>Agrostis alba</i> .....	Redtop
<i>Agrostis</i> spp.....	Bentgrass
<i>Agrostis tenuis</i> .....	Bentgrass, Colonial
Alder.....	<i>Alnus</i> spp.
Alfalfa.....	<i>Medicago sativa</i>
Alfaleria. See Heronbill.	
Algaroba. See Mesquite, common.	
<i>Alnus</i> spp.....	Alder
<i>Alopecurus pratensis</i> .....	Foxtail, meadow
<i>Ananas comosus</i> .....	Pineapple
<i>Andropogon carricosus</i> .....	Bluestem, India
<i>Andropogon pertusus</i> .....	Bluestem, pitted
Anise.....	<i>Pimpinella anisum</i>
<i>Anthoxanthum odoratum</i> .....	Vernalgrass, sweet
<i>Apluda varia</i> .....	Vinegrass
Apple.....	<i>Malus</i> spp.
<i>Arachis hypogaea</i> .....	Peanut
Aroma. See Marabu.	
<i>Arrhenatherum elatius</i> .....	Oatgrass, tall
Artichoke.....	<i>Cynara scolymus</i>
Artichoke, globe. See Artichoke.	
Artichoke, Jerusalem. See sunflower, Jerusalem-artichoke.	
<i>Arundo donax</i> .....	Giantreed
Asbestosbush.....	<i>Duosperma trachyphyllum</i>
Ash.....	<i>Fraxinus</i> spp.
Asparagus.....	<i>Asparagus</i> spp.
<i>Asparagus</i> spp.....	<i>Asparagus</i>
Aspen.....	<i>Populus</i> spp.
<i>Astragalus sinicus</i> .....	Milkvetch, Chinese
<i>Atriplex argentea</i> .....	Saltbush, silvery
<i>Atriplex canescens</i> .....	Saltbush, fourwing
<i>Atriplex semibaccata</i> .....	Saltbush, Australian
<i>Avena barbata</i> .....	Oat, slender



<i>Avena fatua</i> .....	Oat, wild
<i>Avena sativa</i> .....	Oat, common
Avocado.....	<i>Persea americana</i>
<i>Axonopus compressus</i> .....	Carpetgrass, tropical
Babassu.....	<i>Orbignya oleifera</i>
<i>Balsamorhiza sagittata</i> .....	Balsam root, arrowleaf
Balsamroot, arrowleaf.....	<i>Balsamorhiza sagittata</i>
Bamboograss. <i>See</i> Paspalum.	
Banana.....	<i>Musa</i> spp.
Barley.....	<i>Hordeum vulgare</i>
Barnyardgrass.....	<i>Echinochloa crusgalli</i>
Bean.....	<i>Phaseolus</i> spp.
Bean, broad. <i>See</i> Broadbean.	
Bean, carob. <i>See</i> Carob.	
Bean, horse. <i>See</i> Horsebean.	
Bean, hyacinth. <i>See</i> Dolichos, hyacinth.	
Bean, kidney.....	<i>Phaseolus vulgaris</i>
Bean, jack. <i>See</i> Jackbean.	
Bean, mat. <i>See</i> Bean, moth.	
Bean, moth.....	<i>Phaseolus aconitifolius</i>
Bean, mungo.....	<i>Phaseolus mungo</i>
Bean, pinto.....	<i>Phaseolus vulgaris</i> , hort. var.
Bean, urd. <i>See</i> Bean, mungo.	
Bean, velvet. <i>See</i> Velvetbean.	
Beargrass. <i>See</i> Soapweed, small.	
<i>Brassica oleracea acephala</i> .....	Kale
<i>Brassica oleracea capitata</i> .....	Cabbage
<i>Brassica rapa</i> .....	Turnips
<i>Brassica</i> spp.....	Mustard
Breadroot. <i>See</i> Yampa.	
<i>Brevoortia tyrannus</i> .....	Menhaden fish
Bristlegrass.....	<i>Setaria</i> spp.
Bristlegrass, yellow.....	<i>Setaria lutescens</i>
Broadbean.....	<i>Vicia faba</i>
Brome.....	<i>Bromus</i> spp.
Brome, cheatgrass.....	<i>Bromus tectorum</i>
Brome, mountain.....	<i>Bromus carinatus</i>
Brome, smooth.....	<i>Bromus inermis</i>
Brome, soft.....	<i>Bromus mollis</i>
Brome, western. <i>See</i> Brome, mountain.	
Bromegrass. <i>See</i> Brome.	
<i>Bromus carinatus</i> .....	Brome, mountain
<i>Bromus inermis</i> .....	Brome, smooth
<i>Bromus mollis</i> .....	Brome, soft
<i>Bromus</i> spp.....	Brome
<i>Bromus tectorum</i> .....	Brome, cheatgrass
Broomcorn. <i>See</i> Sorghum, broomcorn.	
Browntopmillet.....	<i>Panicum ramosum</i>
(See bristlegrass browntopmillet crabgrass knotstem pennisetum vinegrass mixed hay)	
<i>Buchloe dactyloides</i> .....	Buffalograss
Buckwheat.....	<i>Fagopyrum</i> spp.
Buffalograss.....	<i>Buchloe dactyloides</i>
<i>Beckmannia erucaeformis</i> .....	Sloughgrass, Old World
Beech.....	<i>Fagus</i> spp.
Beet, common. <i>See</i> Mangel.	
Beet, sugar.....	<i>Beta saccharifera</i>
Bentgrass.....	<i>Agrostis</i> spp.
Bentgrass, Colonial.....	<i>Agrostis tenuis</i>
Bermudagrass.....	<i>Cynodon dactylon</i>

Berseem. See Clover, Egyptian.	
<i>Beta saccharifera</i> .....	Beet, sugar
<i>Beta vulgaris</i> .....	Mangel
Birdsfoot trefoil. See Trefoil, birdsfoot.	
Bitterbrush, antelope.....	<i>Purshia tridentata</i>
Black bitter. See Vetch, bitter.	
Blackgrass. See Rush, saltmeadow.	
Bladekelp.....	<i>Laminaria</i> spp.
Bluegrass.....	<i>Poa</i> spp.
Bluegrass, Kentucky.....	<i>Poa pratensis</i>
Bluegrass, Sandberg.....	<i>Poa secunda</i>
Bluejoint. See Reedgrass, bluejoint.	
Bluestem, Colorado. See Wheatgrass, bluestem.	
Bluestem, India.....	<i>Andropogon carricosus</i>
Bluestem, pitted.....	<i>Andropogon pertusus</i>
Bonavist. See Dolichos, hyacinth.	
<i>Brassica campestris</i> .....	Rape, bird
<i>Brassica kaber</i> .....	Charlock
<i>Brassica napobrassica</i> .....	Rutabaga
<i>Brassica napus</i> .....	Rape, winter
Bulrush, sea.....	<i>Scirpus maritimus</i>
Bunchgrass, big or wire. See Wheatgrass, bearded bluebunch.	
Bundleflower, rayado.....	<i>Desmanthus virgatus</i>
Burclover, California.....	<i>Medicago hispida</i>
Bush muhly. See Muhly bush.	
Buttercup.....	<i>Ranunculus</i> spp.
Cabbage.....	<i>Brassica oleracea capitata</i>
Cacao.....	<i>Theobroma cacao</i>
Cactus, pricklypear.....	<i>Opuntia</i> spp.
<i>Cajanus cajan</i> .....	Pigeonpea
<i>Calamagrostis canadensis</i> .....	Reedgrass, bluejoint
<i>Calluna vulgaris</i> .....	Heather, Scotch
<i>Camelina sativa</i> .....	Flaxseed, bigseed
Canarygrass, reed.....	<i>Phalaris arundinacea</i>
<i>Canavalia ensiformis</i> .....	Jackbean, common
Cane. See sugarcane.	
Canna.....	<i>Canna</i> spp.
<i>Canna</i> spp.....	Canna
<i>Cannabis sativa</i> .....	Hemp
Caraway.....	<i>Carum carvi</i>
<i>Carex athrostachya</i> .....	Sedge, slenderbreak
<i>Carex</i> spp.....	Sedge
Carob.....	<i>Ceratonia siliqua</i>
Carpentgrass, tropical.....	<i>Axonopus compressus</i>
Carrot.....	<i>Daucus carota sativa</i>
<i>Carthamus tinctorius</i> .....	Safflower
<i>Carum carvi</i> .....	Caraway
Cassava, common.....	<i>Manihot esculenta</i>
<i>Castanea</i> spp.....	Chestnut
<i>Castilleja miniata</i> .....	Paintedcup, scarlet
Castorbean.....	<i>Ricinus communis</i>
Cattailmillet. See Pearl millet.	
Ceiba, kapok.....	<i>Ceiba pentandra</i>
<i>Ceiba pentandra</i> .....	Ceiba, kapok
<i>Cenchrus biflorus</i> .....	Sandbur, India
<i>Cenchrus</i> spp.....	Sandbur
<i>Ceratonia siliqua</i> .....	Carob
Chaenostoma.....	<i>Chaenostoma</i> spp.
<i>Chaenostoma</i> spp.....	Chaenostoma
Chamiza. See Saltbush, fourwing.	

Charlock	<i>Brassica kaber</i>
Cheat. <i>See</i> Brome, cheatgrass.	
Cherry, black	<i>Prunus serotina</i>
Chestnut	<i>Castanea</i> spp.
Chickling vetch. <i>See</i> Peavine, grass.	
Chickpea, gram	<i>Cicer arietinum</i>
Chicory	<i>Cichorium intybus</i>
( <i>See</i> coffee residue)	
<i>Chloris gayana</i>	Rhodesgrass
Cholla. <i>See</i> Cactus, pricklypear.	
<i>Chrysanthemum leucanthemum</i>	Oxeyedaisy
<i>Cicer arietinum</i>	Chickpea, gram.
<i>Cichorium intybus</i>	Chicory
<i>Citrus limon</i>	Lemon
<i>Citrus</i> spp.	Orange
<i>Cladonia rangiferina</i>	Reindeermoss
Clover	<i>Trifolium</i> spp.
Clover, alsike	<i>Trifolium hybridum</i>
Clover, bur. <i>See</i> Burclover.	
Clover, crimson	<i>Trifolium incarnatum</i>
Clover, Egyptian	<i>Trifolium alexandrinum</i>
Clover, red	<i>Trifolium pratense</i>
Clover, sweet. <i>See</i> Sweetclover.	
Clover, white	<i>Trifolium repens</i>
<i>Clupea harengus</i>	Herring fish
Cocksfoot. <i>See</i> Orchardgrass.	
Cockchafer	<i>Melolontha vulgaris</i>
Cocoa. <i>See</i> cacao.	
Coconut	<i>Cocos nucifera</i>
<i>Cocos nucifera</i>	Coconut
Cod fish	<i>Gadus morrhua</i>
Coffee	<i>Coffea</i> spp.
<i>Coffea</i> spp.	Coffee
<i>Commelina</i> spp.	Dayflower
Cordgrass	<i>Spartina</i> spp.
Corn	<i>Zea mays</i>
Cotton	<i>Gossypium</i> spp.
Couchgrass. <i>See</i> Quackgrass.	
Cowpea	<i>Vigna</i> spp.
Crabgrass	<i>Digitaria</i> spp.
Crabgrass, hairy	<i>Digitaria sanguinalis</i>
( <i>See</i> bristleglass browntopmillet crabgrass knotstem pennisetum vinegrass mixed hay)	
<i>Crepis intermedia</i>	Hawksbeard, gray
Crowfoot. <i>See</i> Trefoil, birdsfoot.	
<i>Cucurbita pepo</i>	Pumpkin
<i>Cuscuta epilinum</i>	Dodder, flax
Cutgrass, clubhead	<i>Leersia hexandra</i>
<i>Cyamopsis psoraloides</i>	Guar
<i>Cymbopogon jwarancusa</i>	Iwarancusagrass
<i>Cynara scolymus</i>	Artichoke
<i>Cynodon dactylon</i>	Bermudagrass
<i>Cynodon plectostachyus</i>	Dogtoothgrass, giant
<i>Cynodon</i> spp.	Dogtoothgrass
<i>Dactylis glomerata</i>	Orchardgrass
<i>Dalbergia</i> spp.	Rosewood
Dallisgrass	<i>Paspalum dilatatum</i>
Dandelion, common	<i>Taraxacum officinale</i>
Dandelion wild. <i>See</i> Hawksbeard, gray.	
Danthonia, poverty	<i>Danthonia spicata</i>

<i>Danthonia spicata</i>	Danthonia, poverty
Darso. See Sorghum.	
<i>Daucus carota sativa</i>	Carrot
Dayflower	<i>Commelina</i> spp.
Deervetch, birdsfoot. See Trefoil, birdsfoot.	
Deervetch, Spanishclover	<i>Lotus americanus</i>
<i>Desmanthus virgatus</i>	Bundleflower, rayado
<i>Dichrostachys glomerata</i>	Marabu
<i>Digitaria pentzi</i>	Fingergrass, Pentz
<i>Digitaria sanguinalis</i>	Crabgrass, hairy
<i>Digitaria</i> spp.	Crabgrass; Fingergrass
<i>Duosperma trachyphyllum</i>	Asbestosbush
<i>Distichlis spicata</i>	Saltgrass, seashore
Dodder, flax	<i>Cuscuta epilinum</i>
Dogtoothgrass	<i>Cynodon</i> spp.
Dogtoothgrass, giant	<i>Cynodon plectostachyus</i>
<i>Dolichos, hyacinth</i>	<i>Dolichos lablab</i>
<i>Dolichos lablab</i>	<i>Dolichos, hyacinth</i>
Doobgrass. See Bermudagrass.	
Doumpalm	<i>Hyphaene</i> spp.
Durra. See Sorghum, durra.	
<i>Echinochloa crusgalli</i>	Barnyardgrass
<i>Echinochloa crusgalli frumentacea</i>	Japanesemillet
Egyptian clover. See Clover, Egyptian.	
<i>Elaeis guineensis</i>	Oilpalm, African
Elephantgrass. See Napiergrass.	
<i>Eleusine indica</i>	Goosegrass
Emmer	<i>Triticum dicoccum</i>
<i>Endomyces vernalis</i>	Fungus, oil
<i>Equisetum arvense</i>	Horsetail, field
<i>Eragrostis abyssinica</i>	Teff
<i>Eragrostis lehmanniana</i>	Lovegrass, Lehmann
<i>Erica tetralix</i>	Heath, crossleaf
<i>Erodium</i> spp.	Heronbill
<i>Eruca sativa</i>	Rocketsalad
Ervil. See Vetch, bitter.	
<i>Fagopyrum</i> spp.	Buckwheat
<i>Fagus</i> spp.	Beech
Falseflax, bigseed	<i>Camelina sativa</i>
Felicia, roughleaf	<i>Felicia muricata</i>
<i>Felicia muricata</i>	Felicia, roughleaf
Fennel, common	<i>Foeniculum vulgare</i>
Fescue	<i>Festuca</i> spp.
Fescue, Idaho	<i>Festuca idahoensis</i>
Fescue, meadow	<i>Festuca elatior</i>
Fescue, red	<i>Festuca rubra</i>
Fescue tall. See Fescue, meadow.	
<i>Festuca elatior</i>	Fescue, meadow
<i>Festuca idahoensis</i>	Fescue, Idaho
<i>Festuca rubra</i>	Fescue, red
<i>Festuca</i> spp.	Fescue
Feterita. See Sorghum, durra.	
<i>Ficus sycomorus</i>	Fig, sycomore
Fig, sycomore	<i>Ficus sycomorus</i>
Filaree. See Heronbill.	
Fingergrass	<i>Digitaria</i> spp.
Fingergrass, Pentz	<i>Digitaria pentzi</i>
Fir	<i>Abies</i> spp.
Flax	<i>Linum</i> spp.
Flax dodder. See Dodder, flax.	

<i>Foeniculum vulgare</i> .....	Fennel, common
Foxgrass. <i>See</i> Cordgrass.	
Foxtail, meadow.....	<i>Alopecurus pratensis</i>
<i>Fraxinus</i> spp.....	Ash
Frijola. <i>See</i> Bean, kidney.	
<i>Fucus</i> spp.....	Rockweed
Fungus, oil.....	<i>Endomyces vernalis</i>
<i>Gadus morrhua</i> .....	Cod fish
Gamagrass, Florida.....	<i>Tripsacum floridanum</i>
Gamagrass, Guatemala.....	<i>Tripsacum laxum</i>
<i>Gasterosteus aculeatus</i> .....	Stickleback fish
Giantreed.....	<i>Arundo donax</i>
Girasole. <i>See</i> Sunflower, Jerusalem-artichoke.	
Goober, Congo.....	<i>Voandzeia subterranea</i>
Goosegrass.....	<i>Eleusine indica</i>
<i>Gossypium</i> spp.....	Cotton
Grape.....	<i>Vitis</i> spp.
Grasspea. <i>See</i> Peavine, grass.	
Groundnut. <i>See</i> Peanut or Goober, Congo.	
Guamgrass. <i>See</i> Gamagrass, Florida.	
Guar.....	<i>Cyamopsis psoraloides</i>
Guatemala grass. <i>See</i> Gamagrass, Guatemala.	
Guineagrass.....	<i>Panicum maximum</i>
<i>Guizotia abyssinica</i> .....	Nigerseed, Ethiopian
Gum arabic. <i>See</i> Acacia.	
Haricot. <i>See</i> Bean, kidney.	
Hawksbeard, gray.....	<i>Crepis intermedia</i>
Heath, crossleaf.....	<i>Erica tetralix</i>
Heather, sand. <i>See</i> Heather, Scotch.	
Heather, Scotch.....	<i>Calluna vulgaris</i>
Hegari. <i>See</i> Sorghum.	
<i>Helianthus</i> spp.....	Sunflower
<i>Helianthus tuberosus</i> .....	Sunflower, Jerusalem-artichoke
Hemp.....	<i>Cannabis sativa</i>
Heronbill (Alfileria or Filaree).....	<i>Erodium</i> spp.
Herring fish.....	<i>Clupea harengus</i>
<i>Heteropogon contortus</i> .....	Tanglehead
<i>Hevea brasiliensis</i> .....	Rubbertree, Para
<i>Hierochloa odorata</i> .....	Sweetgrass
<i>Hilaria mutica</i> .....	Tobosa
Hona Hona. <i>See</i> Dayflower.	
Hops.....	<i>Humulus</i> spp.
<i>Hordeum vulgare</i> .....	Barley
Horsebean.....	<i>Vicia faba equina</i>
Horsechestnut.....	<i>Aesculus hippocastanum</i>
Horsetail, field.....	<i>Equisetum arvense</i>
( <i>See</i> Silvergrass, Chinese, field horsetail mixed hay)	
<i>Humulus</i> spp.....	Hops
Hungarian grass. <i>See</i> Millet, foxtail.	
Hungarian millet. <i>See</i> Millet, foxtail.	
Hyacinthbean. <i>See</i> Dolichos, hyacinth.	
<i>Hydrochloa caroliniensis</i> .....	Watergrass
<i>Hyphaene</i> spp.....	Doumpalm
<i>Imperata brasiliensis</i> .....	Satintail, Brazil
Indian corn. <i>See</i> corn.	
Indianpink, mountain. <i>See</i> Paintedcup, scarlet.	
Indian potato. <i>See</i> Yampa.	
Ipo. <i>See</i> Yampa.	
<i>Ipomoea batatas</i> .....	Sweetpotato
<i>Iseilema wighti</i> .....	Rooigrass, Wight

Itchgrass.....	<i>Rottboellia</i> spp.
Ivorypalm, common.....	<i>Phytelephas macrocarpa</i>
(See Ivory nut meal)	
Iwarancusagrass.....	<i>Cymbopogon iwarancusa</i>
(See Bristlegrass, yellow, iwarancusagrass rooigrass sorghum mixed hay)	
Jackbean, common.....	<i>Canavalia ensiformis</i>
Japanesemillet.....	<i>Echinochloa crusgalli frumentacea</i>
Jerusalem-artichoke. See Sunflower, Jerusalem-artichoke.	
Johnsongrass.....	<i>Sorghum halepense</i>
<i>Juglans</i> spp.....	Walnut
Julbana. See Peavine, grass.	
<i>Juncus balticus</i> .....	Rush, Baltic
<i>Juncus gerardi</i> .....	Rush, saltmeadow
<i>Juncus</i> spp.....	Rush
Junebug. See Cockchafer.	
Kafir. See Sorghum, kafir.	
Kale.....	<i>Brassica oleracea acephala</i>
Kaliharigrass.....	<i>Schmidtia kalahariensis</i>
Kangaroograss (India).....	<i>Themeda anathera</i>
Kangaroograss (Africa).....	<i>Themeda triandra</i>
Kapok. See Ceiba, kapok.	
Karroobush.....	<i>Phymaspermum parvifolium</i>
Kelp. See Bladekelp or Rockweed.	
Kersenneh. See Vetch, bitter.	
Knotgrass.....	<i>Paspalum distichum</i>
(See Bermudagrass knotgrass mixed hay)	
Knotstem pennisetum. See Pennisetum, knotstem.	
Lablab. See Dolichos, hyacinth.	
<i>Laminaria</i> spp.....	Bladekelp
<i>Lathyrus lanszwerti</i> .....	Peavine, thickleaf
<i>Lathyrus sativus</i> .....	Peavine, grass
<i>Lathyrus</i> spp.....	Peavine
Leadtree, whitepopinac.....	<i>Leucaena glauca</i>
<i>Leersia hexandra</i> .....	Cutgrass, clubhead
Lemon.....	<i>Citrus limon</i>
<i>Lens culinaris</i> .....	Lentil, common
Lentil, common.....	<i>Lens culinaris</i>
Leptotaenia, carrotleaf.....	<i>Leptotaenia multifida</i>
<i>Leptotaenia multifida</i> .....	Leptotaenia, carrotleaf
Lespedeza.....	<i>Lespedeza</i> spp.
Lespedeza, bush.....	<i>Lespedeza cyrtobotrya</i>
(See Silvergrass, Chinese, bush lespedeza mixed hay)	
<i>Lespedeza cyrtobotrya</i> .....	Lespedeza, bush
Lespedeza, Korean.....	<i>Lespedeza stipulacea</i>
<i>Lespedeza</i> spp.....	Lespedeza
<i>Lespedeza stipulacea</i> .....	Lespedeza, Korean
<i>Leucaena glauca</i> .....	Leadtree, whitepopinac
Lichen, reindeer. See Reindeermoss.	
<i>Linum</i> spp.....	Flax
<i>Lolium multiflorum</i> .....	Ryegrass, Italian
<i>Lolium perenne</i> .....	Ryegrass, perennial
<i>Lolium</i> spp.....	Ryegrass
<i>Lotus americanus</i> .....	Deervetch, Spanishclover
<i>Lotus corniculatus</i> .....	Trefoil, birdsfoot
Lovegrass, Lehmann.....	<i>Eragrostis lehmanniana</i>
Lucerne. See Alfalfa.	
Lupine.....	<i>Lupinus</i> spp.
Lupine, blue.....	<i>Lupinus angustifolius</i>
Lupine, European yellow.....	<i>Lupinus luteus</i>
Lupine, white.....	<i>Lupinus albus</i>

<i>Lupinus albus</i> .....	Lupine, white
<i>Lupinus angustifolius</i> .....	Lupine, blue
<i>Lupinus luteus</i> .....	Lupine, European yellow
<i>Lupinus</i> spp.....	Lupine
Maize. See Corn.	
Malojillo grass. See Paragrass.	
Mallow.....	<i>Malva</i> spp.
Mallow, curly.....	<i>Malva crispa</i>
Mallow, smooth.....	<i>Malva</i> spp.
<i>Malus</i> spp.....	Apple
<i>Malva crispa</i> .....	Mallow, curly
<i>Malva</i> spp.....	Mallow, smooth
<i>Malva</i> spp.....	Mallow
Mangel.....	<i>Beta vulgaris</i>
<i>Manihot esculenta</i> .....	Cassava, common
Marabu.....	<i>Dichrostachys glomerata</i>
Medic, black.....	<i>Medicago lupulina</i>
<i>Medicago hispida</i> .....	Burclover, California
<i>Medicago lupulina</i> .....	Medic, black
<i>Medicago sativa</i> .....	Alfalfa
<i>Melilotus alba</i> .....	Sweetclover, white
<i>Melilotus indica</i> (= <i>M. parviflora</i> ).....	Sweetclover, annual yellow
<i>Melilotus</i> spp.....	Sweetclover
<i>Melinis minutiflora</i> .....	Molassesgrass
<i>Melolontha vulgaris</i> .....	Cockchafer
Menhaden fish.....	<i>Brevoortia tyrannus</i>
Merkergress. See Napiergrass.	
Mesquite, common.....	<i>Prosopis juliflora</i>
Mesquitegrass. See Muhly, bush.	
<i>Metroxylon sagu</i> .....	Sagopalm, smooth
Milkvetch, Chinese.....	<i>Astragalus sinicus</i>
Millet.....	<i>Setaria</i> spp.
Millet, broomcorn. See Proso.	
Millet, bulrush. See Pearl millet.	
Millet, foxtail.....	<i>Setaria italica</i>
Millet, hog. See Proso.	
Millet, Hungarian. See Millet, foxtail.	
Millet, Italian. See Millet, foxtail.	
Millet, Japanese. See Japanesemillet.	
Millet, pearl. See Pearl millet.	
Millet, Russian. See Proso.	
Milo. See Sorghum, milo.	
<i>Miscanthus sinensis</i> (= <i>Eulalia japonica</i> ).....	Silvergrass, Chinese
Molassesgrass.....	<i>Melinis minutiflora</i>
<i>Molinia caerulea</i> .....	Moorgress
Moorgress.....	<i>Molinia caerulea</i>
Moss. See Reindeermoss, Sphagnum or Tillandsia, treebeard.	
Mountainbush, bitter. See Bitterbrush, antelope.	
<i>Muhlenbergia porteri</i> .....	Muhly, bush
Muhly, bush.....	<i>Muhlenbergia porteri</i>
<i>Musa</i> spp.....	Banana
Mustard.....	<i>Brassica</i> spp.
Napiergrass.....	<i>Pennisetum purpureum</i>
Nettle.....	<i>Urtica</i> spp.
Nigerseed, Ethiopian.....	<i>Guizotia abyssinica</i> .
<i>Nolina microcarpa</i> .....	Sacahuista
Oak, live.....	<i>Quercus virginiana</i>
Oak, post.....	<i>Quercus stellata</i>
Oat, common.....	<i>Avena sativa</i>
Oat, slender.....	<i>Avena barbata</i>



(See Brome, soft, fescue slender oat mixed hay)	
Oat, wild	<i>Avena fatua</i>
(See Oats, mill or low grade)	
Oatgrass, poverty. See <i>Danthonia</i> , poverty.	
Oatgrass, tall	<i>Arrhenatherum elatius</i>
Oilpalm, African	<i>Elaeis guineensis</i>
<i>Olea</i> spp.	Olive
Olive	<i>Olea</i> spp.
<i>Onobrychis viciaefolia</i>	Sainfoin, common
<i>Opuntia</i> spp.	Cactus, pricklypear
Orange	<i>Citrus</i> spp.
<i>Orbignya oleifera</i>	Babassu
Orchardgrass	<i>Dactylis glomerata</i>
<i>Ornithopus sativus</i>	Seradella, common
<i>Oryza sativa</i>	Rice
Oxeyedaisy	<i>Chrysanthemum leucanthemum</i>
Paintedcup, scarlet	<i>Castilleja miniata</i>
Palm. See Doumpalm, Ivorypalm and Oilpalm.	
<i>Panicum</i>	<i>Panicum</i> spp.
<i>Panicum maximum</i>	Guineagrass
<i>Panicum miliaceum</i>	Proso
<i>Panicum obtusum</i>	Vine-mesquite
<i>Panicum purpurascens</i>	Paragrass
<i>Panicum ramosum</i>	Browntopmillet
<i>Panicum</i> spp.	<i>Panicum</i>
<i>Papaver somniferum</i>	Poppy, opium
Paragrass	<i>Panicum purpurascens</i>
<i>Paspalum</i>	<i>Paspalum fasciculatum</i>
<i>Paspalum dilatatum</i>	Dallisgrass
<i>Paspalum distichum</i>	Knotgrass
<i>Paspalum fasciculatum</i>	<i>Paspalum</i>
Pea	<i>Pisum</i> spp.
Pea, field	<i>Pisum sativum arvense</i>
Pea, grass. See Peavine, grass.	
Pea, pigeon. See Pigeonpea.	
Peanut	<i>Arachis hypogaea</i>
Pear	<i>Pyrus</i> spp.
Pearlmillet	<i>Pennisetum glaucum</i>
Peavine	<i>Lathyrus</i> spp.
Peavine, grass	<i>Lathyrus sativus</i>
Peavine, thickleaf	<i>Lathyrus lanszwerti</i>
<i>Pennisetum</i> , knotstem	<i>Pennisetum ciliare</i>
(See Bristlegrass browntopmillet crabgrass knotstem pennisetum vinegrass mixed hay)	
<i>Pennisetum ciliare</i>	<i>Pennisetum</i> , knotstem
<i>Pennisetum glaucum</i>	Pearlmillet
<i>Pennisetum purpureum</i>	Napiergrass
<i>Pentzia incana</i>	Sheepbush, hoary
<i>Pentzia sphaerocephala</i>	Sheepbush, ballhead
<i>Perideridia gairdneri</i>	Yampa
Perilla, common	<i>Perilla frutescens</i>
<i>Perilla frutescens</i>	Perilla, common
<i>Persea americana</i>	Avocado
<i>Phacelia tanacetifolia</i>	Phacelia, tansy
Phacelia, tansy	<i>Phacelia tanacetifolia</i>
<i>Phalaris arundinacea</i>	Canarygrass, reed
<i>Phaseolus aconitifolius</i>	Bean, moth
<i>Phaseolus mungo</i>	Bean, mungo
<i>Phaseolus</i> spp.	Bean
<i>Phaseolus vulgaris</i>	Bean, kidney

<i>Phaseolus vulgaris</i> (hort. var.)	Bean, pinto
<i>Phleum pratense</i>	Timothy
<i>Phragmites communis</i>	Reed, common
<i>Phragmites</i> spp	Reed
<i>Phymaspermum parvifolium</i>	Karroobush
<i>Phytelephas macrocarpa</i>	Ivorypalm, common
Pigeonpea	<i>Cajanus cajan</i>
Pilchard fish	<i>Sardinia pilchardus</i>
<i>Pimpinella anisum</i>	Anise
Pine	<i>Pinus</i> spp.
Pineapple	<i>Ananas comosus</i>
Pintobean. See Bean, pinto.	
<i>Pinus</i> spp.	Pine
<i>Pisum sativum arvense</i>	Pea, field
<i>Pisum</i> spp.	Pea
Plum	<i>Prunus</i> spp.
<i>Poa pratensis</i>	Bluegrass, Kentucky
<i>Poa secunda</i>	Bluegrass, Sandberg
<i>Poa</i> spp.	Bluegrass
Poplar	<i>Populus</i> spp.
Poplar, black	<i>Populus nigra</i>
Poppy, opium	<i>Papaver somniferum</i>
<i>Populus nigra</i>	Poplar, black
<i>Populus</i> spp.	Aspen; poplar
Potato	<i>Solanum tuberosum</i>
Poverty grass. See Danthonia, poverty.	
Pricklypear. See Cactus, pricklypear.	
Proso	<i>Panicum miliaceum</i>
<i>Prosopis juliflora</i>	Mesquite, common
<i>Prunus serotina</i>	Cherry, black
<i>Prunus</i> spp	Plum
Pumpkin	<i>Cucurbita pepo</i>
<i>Purshia tridentata</i>	Bitterbrush, antelope
<i>Pyrus</i> spp.	Pear
Quackgrass	<i>Agropyron repens</i>
<i>Quercus stellata</i>	Oak, post
<i>Quercus virginiana</i>	Oak, live
Quitchgrass. See Quackgrass.	
Radish, oilseed	<i>Raphanus sativus oleiferus</i>
<i>Ranunculus</i> spp	Buttercup
Rape, bird	<i>Brassica campestris</i>
Rape, winter	<i>Brassica napus</i>
<i>Raphanus sativus oleiferus</i>	Radish, oilseed
Redtop	<i>Agrostis alba</i>
Reed	<i>Phragmites</i> spp.
Reed, common	<i>Phragmites communis</i>
Reed canarygrass. See Canarygrass, reed.	
Reedgrass, bluejoint	<i>Calamagrostis canadensis</i>
Reindeermoss	<i>Cladonia rangiferina</i>
Rhaphis, goldplume	<i>Raphis montana</i>
(See Itchgrass goldplume rhaphis mixed hay)	
<i>Rhaphis montana</i>	Rhaphis, goldplume
Rhodesgrass	<i>Chloris gayana</i>
Rice	<i>Oryza sativa</i>
<i>Ricinus communis</i>	Castorbean
Rocketsalad	<i>Eruca sativa</i>
Rockweed	<i>Fucus</i> spp.
Rooigrass, Wight	<i>Iseilema wighti</i>
(See Bristlegrass, yellow, iwarancusagrass rooigrass sorghum mixed hay)	
Rosewood	<i>Dalbergia</i> spp.

<i>Rottboellia</i> spp.	Itchgrass
Rubbertree, Para	<i>Hevea brasiliensis</i>
(See Rubber seed oil meal)	
Russianthistle, tumbling	<i>Salsola kali tenuifolia</i>
Rush	<i>Juncus</i> spp.
Rush, Baltic	<i>Juncus balticus</i>
Rush, saltmeadow	<i>Juncus gerardi</i>
Rutabaga	<i>Brassica napobrassica</i>
Rye	<i>Secale cereale</i>
Ryegrass	<i>Lolium</i> spp.
Ryegrass, Italian	<i>Lolium multiflorum</i>
Ryegrass, perennial	<i>Lolium perenne</i>
Sacahuista	<i>Nolina microcarpa</i>
<i>Saccharomyces cerevisiae</i>	Yeast, brewers
<i>Saccharum officinarum</i>	Sugarcane
Safflower	<i>Carthamus tinctorius</i>
Sagopalm, smooth	<i>Metroxylon sagu</i>
Sainfoin, common	<i>Onobrychis viciaefolia</i>
St. Johnsbread. See Carob.	
<i>Salix</i> spp.	Willow
<i>Salsola kali tenuifolia</i>	Russianthistle, tumbling
Saltbush, Australian	<i>Atriplex semibaccata</i>
Saltbush, fourwing	<i>Atriplex canescens</i>
Saltbush, silvery	<i>Atriplex argentea</i>
Saltgrass, seashore	<i>Distichlis spicata</i>
Sandbur	<i>Cenchrus</i> spp.
Sandbur, India	<i>Cenchrus biflorus</i>
<i>Sardinia pilchardus</i>	Pilchard fish
Satintail, Brazil	<i>Imperata brasiliensis</i>
Savannahgrass. See Carpetgrass.	
<i>Schmidia kalihariensis</i>	Kaliharigrass
<i>Scripus maritimus</i>	Bulrush, sea
Schrock. See Sorgho.	
Seaweed. See Bladekelp or Rockweed.	
<i>Secale cereale</i>	Rye
Sedge	<i>Carex</i> spp.
Sedge, slenderbreak	<i>Carex athrostachya</i>
(See Rush slenderbreak sedge grass legume mixed hay)	
Senji. See Sweetclover.	
Serradella, common	<i>Ornithopus sativus</i>
Sesame, Oriental	<i>Sesamum indicum</i>
<i>Sesamum indicum</i>	Sesame, Oriental
<i>Setaria italica</i>	Millet, foxtail
<i>Setaria lutescens</i>	Bristlegrass, yellow
<i>Setaria</i> spp.	Bristlegrass; millet
Shallu. See Sorghum, shallu.	
Sheepbush, ballhead	<i>Pentzia sphaerocephala</i>
Sheepbush, hoary ("Australian")	<i>Pentzia incana</i>
Shisham. See Rosewood.	
Silvergrass, Chinese	<i>Miscanthus sinensis</i> (= <i>Eulalia japonica</i> )
Sloughgrass, Old World	<i>Beckmannia erucaeformis</i>
Soapweed	<i>Yucca</i> spp.
Soapweed, small	<i>Yucca glauca</i>
<i>Soja max</i> (= <i>Glycine soja</i> )	Soybean
<i>Solanum tuberosum</i>	Potato
Sorghum	<i>Sorghum vulgare</i>
Sorghum, broomcorn	<i>Sorghum vulgare technicum</i>
Sorghum, durra	<i>Sorghum vulgare durra</i>
<i>Sorghum halepense</i>	Johnsongrass

Sorghum, kafir	<i>Sorghum vulgare caffrorum</i>
Sorghum, milo	<i>Sorghum vulgare subglabrescens</i>
Sorghum, shallu	<i>Sorghum vulgare roxburghi</i>
Sorghum, sorgho	<i>Sorghum vulgare saccharatum</i>
Sorghum, Sudangrass	<i>Sorghum vulgare sudanese</i>
Sorghum, sweet. See Sorghum, sorgho.	
<i>Sorghum vulgare</i>	<i>Sorghum, darso</i>
<i>Sorghum vulgare caffrorum</i>	<i>Sorghum, kafir</i>
<i>Sorghum vulgare durra</i>	<i>Sorghum, durra; Feterita</i>
<i>Sorghum vulgare roxburghi</i>	<i>Sorghum, shallu</i>
<i>Sorghum vulgare saccharatum</i>	<i>Sorghum, sorgho</i>
<i>Sorghum vulgare subglabrescens</i>	<i>Sorghum, milo</i>
<i>Sorghum vulgare sudanense</i>	<i>Sorghum, Sudangrass</i>
<i>Sorghum vulgare technicum</i>	<i>Broomcorn</i>
Sourclover. See Sweetclover, annual yellow.	
Soybean	<i>Soja max (=Glycine soja)</i>
Spanish-bayonet. See Soapweed.	
Spanish-clover. See Deervetch, Spanishclover.	
Spanish-moss. See Tillandsia, treebeard.	
<i>Spartina</i> spp.	<i>Cordgrass</i>
Spelt	<i>Triticum spelta</i>
Sphagnum	<i>Sphagnum</i> spp.
<i>Sphagnum</i> spp.	<i>Sphagnum</i>
Squawroot. See Yampa.	
Stargrass. See Dogtoothgrass.	
Stickleback fish	<i>Gasterosteus aculeatus</i>
<i>Stizolobium</i> spp.	<i>Velvetbean</i>
Sudangrass. See Sorghum, Sudangrass.	
Sugar beet. See Beet, sugar.	
Sugarcane	<i>Saccharum officinarum</i>
Sunflower	<i>Helianthus</i> spp.
Sunflower, Jerusalem-artichoke	<i>Helianthus tuberosus</i>
Sweetclover	<i>Melilotus</i> spp.
Sweetclover, white	<i>Melilotus alba</i>
Sweetclover, annual yellow	<i>Melilotus indica (=M. parviflora)</i>
Sweetgrass	<i>Hierochloa odorata</i>
Sweetpotato	<i>Ipomoea batatas</i>
Sycamore fig. See Fig, sycamore.	
Taguanut. See Ivorypalm, common.	
Tanglehead	<i>Heteropogon contortus</i>
Tansy, phacelia. See Phacelia, tansy.	
Tapioca. See Cassava, common.	
<i>Taraxacum officinale</i>	<i>Dandelion, common</i>
Teff	<i>Eragrostis abyssinica</i>
<i>Tetragonia arbuscula</i>	<i>Tetragonia, bush</i>
<i>Tetragonia, bush</i>	<i>Tetragonia arbuscula</i>
<i>Themeda anathera</i> (India)	<i>Kangaroo grass</i>
<i>Themeda triandra</i> (Africa)	<i>Kangaroo grass</i>
<i>Theobroma cacao</i>	<i>Cacao</i>
<i>Thunus</i> spp.	<i>Tunny</i>
<i>Tillandsia, treebeard</i>	<i>Tillandsia usneoides</i>
<i>Tillandsia usneoides</i>	<i>Tillandsia, treebeard</i>
Timothy	<i>Phleum pratense</i>
Tobosa	<i>Hilaria mutica</i>
Tofah. See Peavine.	
Toria. See Rape, winter.	
<i>Torula utilis</i>	<i>Yeast, mineral</i>
Trefoil, birdsfoot (Birdsfoot deervetch)	<i>Lotus corniculatus</i>
<i>Trifolium alexandrinum</i>	<i>Clover, Egyptian</i>
<i>Trifolium hybridum</i>	<i>Clover, alsike</i>

<i>Trifolium incarnatum</i> .....	Clover, crimson
<i>Trifolium pratense</i> .....	Clover, red
<i>Trifolium repens</i> .....	Clover, white
<i>Trifolium</i> spp.....	Clover
<i>Tripsacum floridanum</i> .....	Gamagrass, Florida
<i>Tripsacum laxum</i> .....	Gamagrass, Guatemala
<i>Tripteris pachypteris</i> .....	Tripteris, thickwing
Tripteris, thickwing.....	<i>Tripteris pachypteris</i>
<i>Triticum dicoccum</i> .....	Emmer
<i>Triticum durum</i> .....	Wheat, durum
<i>Triticum spelta</i> .....	Spelt
<i>Triticum</i> spp.....	Wheat
Tunny.....	<i>Thunnus</i> spp.
(See Fish meal, tuna)	
Turnip.....	<i>Brassica rapa</i>
<i>Urtica</i> spp.....	Nettle
Vegetable ivory. See Ivorypalm, common.	
Velvetbean.....	<i>Stizolobium</i> spp.
Vernalgrass, sweet.....	<i>Anthoxanthum odoratum</i>
(See Bluegrass, Kentucky, clover sweet vernalgrass mixed hay)	
Vetch.....	<i>Vicia</i> spp.
Vetch, bitter. See Peavine, thickleaf.	
Vetch, bitter.....	<i>Vicia ervilia</i>
Vetch, chickling. See Peavine, grass.	
Vetch, common.....	<i>Vicia sativa</i>
Vetch, hairy.....	<i>Vicia villosa</i>
Vetch, milk. See Milkvetch, Chinese.	
Vetch, Narbonne.....	<i>Vicia narbonensis</i>
Vetch, Russian. See Vetch, hairy.	
Vetch, sand. See Vetch, hairy.	
Vetch, winter. See Vetch, hairy.	
<i>Vicia ervilia</i> .....	Vetch, bitter
<i>Vicia faba</i> .....	Broadbean
<i>Vicia faba equina</i> .....	Horsebean
<i>Vicia narbonensis</i> .....	Vetch, Narbonne
<i>Vicia sativa</i> .....	Vetch, common
<i>Vicia</i> spp.....	Vetch
<i>Vicia villosa</i> .....	Vetch, hairy
<i>Vigna</i> spp.....	Cowpea
Vinegrass.....	<i>Apluda varia</i>
(See Bristlegrass browntopmillet crabgrass knotstem pennisetum vinegrass mixed hay)	
Vine-mesquite.....	<i>Panicum obtusum</i>
(See tobosa vine-mesquite mixed hay)	
<i>Vitis</i> spp.....	Grape
<i>Voandzeia subterranea</i> .....	Goober, Congo
Walnut.....	<i>Juglans</i> spp.
Watergrass.....	<i>Hydrochloa caroliniensis</i>
Wheat.....	<i>Triticum</i> spp.
Wheat, durum.....	<i>Triticum durum</i>
Wheatgrass, bearded bluebunch.....	<i>Agropyron spicatum</i>
Wheatgrass, beardless bluebunch.....	<i>Agropyron inerme</i>
Wheatgrass, bluestem.....	<i>Agropyron smithi</i>
Wheatgrass, crested.....	<i>Agropyron cristatum</i>
Wheatgrass, slender.....	<i>Agropyron trachycaulum</i> (= <i>A. pauciflorum</i> )
Wheatgrass, western. See Wheatgrass, bluestem.	
White fish.. See Haddock or Cod fish.	
Whiteweed. See Oxeyedaisy.	
Wildcaraway. See Yampa.	

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Wild oat. <i>See</i> Oat, wild.	
Willow.....	<i>Salix</i> spp.
Wiregrass. <i>See</i> Bermudagrass.	
Woolly pyrol. <i>See</i> Bean, mungo.	
Woundwort. <i>See</i> Oxeyedaisy.	
<i>Wyethia mollis</i> .....	<i>Wyethia</i> , woolly
<i>Wyethia</i> , woolly.....	<i>Wyethia mollis</i>
Yampa.....	<i>Perideridia gairdneri</i>
Yaragua. <i>See</i> Molassesgrass.	
Yeast, brewers.....	<i>Saccharomyces cerevisiae</i>
Yeast, mineral.....	<i>Torula utilis</i>
Yucca. <i>See</i> Soapweed.	
<i>Yucca glauca</i> .....	Soapweed, small
<i>Yucca</i> spp.....	Soapweed
<i>Zea mays</i> .....	Corn

**SECTION IV**

**DIGESTIBILITY AND COMPOSITION**

**OF FEEDING STUFFS**



TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutri- tive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	<i>Acacia pods, dry</i> .....	91.3	4.1	52.0	11.7	3.3	8.0	22.3	56.4	1.3	(1)
(2)	Alfalfa hay, all expts.....	88.7	9.8	49.8	4.0	7.9	14.1	28.1	36.8	1.8	(2)
(3)	—hay, all expts.....	90.6	8.5	46.9	4.5	7.3	14.0	32.1	35.6	1.6	(3)
(4)	—hay, prebloom.....	84.5	11.7	53.2	3.6	6.0	16.4	24.1	35.3	2.7	(4)
(5)	—hay, early bloom.....	88.8	9.9	50.7	4.1	7.5	14.4	29.3	36.2	1.4	(5)
(6)	—hay, half bloom.....	87.6	10.5	50.5	3.8	7.1	14.8	28.4	35.9	1.4	(6)
(7)	—hay, full bloom.....	85.3	10.3	47.9	3.6	8.1	14.3	28.8	32.4	1.7	(7)
(8)	—hay, dehydrated.....	87.6	10.2	53.7	4.3	6.2	15.0	25.2	39.2	2.0	(8)
(9)	—hay, dehydrated.....	90.0	13.1	52.4	3.0	7.1	17.3	22.7	41.1	1.8	(9)
(10)	—hay, prebloom, dehydrated.....	87.0	12.1	55.9	3.6	6.6	17.3	22.0	38.7	2.4	(10)
(11)	—hay, early bloom, dehydrated.....	88.5	9.9	52.1	4.3	6.8	14.5	27.3	38.0	1.9	(11)
(12)	—hay, half bloom, dehydrated.....	87.5	9.0	53.1	4.9	5.6	13.6	26.2	40.3	1.8	(12)
(13)	—hay, dried on riders..	(86.4)	11.6	49.3	3.3	7.4	14.9	25.8	36.4	1.9	(13)
(14)	—hay, excellent quality, extra green.....	88.1	10.7	50.7	3.7	7.9	14.3	26.5	37.6	1.8	(14)
(15)	—hay, 1st cutting.....	85.4	6.2	47.6	6.7	7.2	9.6	25.4	41.5	1.7	(15)
(16)	—hay, 1st cutting, prebloom.....	85.8	5.5	50.5	8.1	7.0	8.9	23.6	44.3	2.0	(16)
(17)	—hay, 1st cutting, half bloom.....	88.2	6.4	48.8	6.7	8.0	9.7	25.1	43.9	1.5	(17)
(18)	—hay, 1st cutting, full bloom.....	82.3	6.8	44.9	5.6	6.7	10.0	27.4	36.6	1.6	(18)
(19)	—hay, 2d cutting.....	88.7	8.3	49.7	5.0	8.2	11.9	28.6	38.1	1.9	(19)
(20)	—hay, 2d cutting.....	94.9	6.0	44.3	6.4	9.6	13.4	30.6	39.3	2.0	(20)
(21)	—hay, 2d cutting, prebloom.....	89.4	6.7	49.5	6.4	8.9	10.1	28.2	40.3	1.9	(21)
(22)	—hay, 2d cutting, early bloom.....	84.2	12.5	48.0	2.9	7.7	17.3	23.4	34.5	1.3	(22)
(23)	—hay, 2d cutting, half bloom.....	88.9	7.9	51.5	5.5	7.1	10.8	28.4	40.6	2.0	(23)
(24)	—hay, 2d cutting, full bloom.....	83.8	7.4	47.6	5.6	7.3	10.2	29.2	35.4	1.7	(24)
(25)	—hay, 3d or later cutting.....	84.8	8.1	46.4	4.7	7.5	11.5	23.6	40.2	2.0	(25)
(26)	—hay, 3d cutting, full bloom.....	83.2	7.2	45.5	5.4	8.2	10.3	21.6	41.1	2.0	(26)
(27)	—hay, low ash.....	88.4	9.6	50.8	4.3	6.9	13.8	28.5	37.4	1.8	(27)
(28)	—hay, high ash.....	89.5	10.4	48.9	3.7	9.2	14.6	27.7	36.2	1.8	(28)
(29)	—hay, under 25% fiber.....	87.5	10.2	51.4	4.1	7.6	14.5	23.4	39.9	2.1	(29)
(30)	—hay, 25-28% fiber..	88.5	10.4	49.9	3.8	8.0	14.3	26.4	37.9	1.9	(30)
(31)	—hay, 28-31% fiber..	88.8	10.0	49.8	4.0	8.2	14.3	28.9	35.7	1.7	(31)
(32)	—hay, 31-34% fiber..	89.9	9.2	49.4	4.4	7.6	13.1	32.0	35.9	1.3	(32)
(33)	—hay, over 34% fiber.....	89.1	8.3	48.2	4.8	4.8	12.0	36.2	34.8	1.3	(33)
(34)	—hay, under 13% protein.....	88.9	7.8	49.2	5.3	7.4	11.5	29.6	38.7	1.7	(34)
(35)	—hay, 13% protein....	88.9	9.8	48.4	3.9	7.9	14.2	27.9	37.3	1.6	(35)
(36)	—hay, 15% protein....	88.5	11.7	51.4	3.4	8.0	15.8	27.9	34.9	1.9	(36)

## AND DIGESTIBILITY WITH CATTLE

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
(1)	56	51	16	75	71	2	4.5	57.0	3.6	8.8	24.4	61.8	1.4	(1)	
(2)	61	70	44	71	35	137	11.1	56.1	8.9	15.9	31.7	41.5	2.0	(2)	
(3)	56	61	39	69	36	14	9.4	51.8	8.1	15.5	35.4	39.2	1.8	(3)	
(4)	65	71	55	70	58	9	13.8	62.9	7.1	19.4	28.5	41.8	3.2	(4)	
(5)	62	69	48	70	43	6	11.2	57.1	8.5	16.2	33.0	40.7	1.6	(5)	
(6)	62	71	46	72	32	20	12.0	57.6	8.1	16.9	32.4	41.0	1.6	(6)	
(7)	61	72	45	72	35	9	12.1	56.2	9.5	16.8	33.8	37.9	2.0	(7)	
(8)	64	68	51	73	45	27	11.6	61.3	7.1	17.1	28.8	44.7	2.3	(8)	
(9)	62	76	38	70	45	1	14.6	58.2	7.9	19.2	25.2	45.7	2.0	(9)	
(10)	68	70	54	75	54	9	13.9	64.3	7.6	19.9	25.3	44.4	2.8	(10)	
(11)	63	68	49	72	36	9	11.2	58.9	7.7	16.4	30.9	42.8	2.2	(11)	
(12)	64	66	49	73	46	11	10.3	60.7	6.4	15.6	29.9	46.0	2.1	(12)	
(13)	62	78	42	70	33	2	13.4	57.1	8.6	17.2	29.9	42.1	2.2	(13)	
(14)	63	75	44	73	23	3	12.2	57.6	9.0	16.2	30.1	42.7	2.0	(14)	
(15)	60	65	40	72	35	6	7.3	55.8	8.4	11.2	29.7	48.7	2.0	(15)	
(16)	63	62	43	75	38	2	6.4	58.9	8.2	10.4	27.5	51.6	2.3	(16)	
(17)	60	65	38	73	28	2	7.2	55.3	9.1	11.0	28.5	49.7	1.7	(17)	
(18)	58	68	40	70	39	2	8.3	54.5	8.1	12.2	33.3	44.4	2.0	(18)	
(19)	61	70	44	71	40	10	9.4	56.0	9.2	13.4	32.2	43.1	2.1	(19)	
(20)	53	45	32	68	39	2	6.3	46.7	10.1	14.1	32.3	41.4	2.1	(20)	
(21)	61	66	45	71	38	2	7.5	55.4	10.0	11.3	31.6	45.0	2.1	(21)	
(22)	62	72	45	70	30	2	14.8	57.0	9.2	20.5	27.8	40.9	1.6	(22)	
(23)	62	73	42	73	45	2	8.9	57.9	8.0	12.2	31.9	45.6	2.3	(23)	
(24)	61	72	46	71	44	2	8.8	56.8	8.7	12.2	34.9	42.2	2.0	(24)	
(25)	59	70	38	69	36	6	9.5	54.7	8.9	13.6	27.8	47.3	2.4	(25)	
(26)	60	69	34	71	42	2	8.6	54.7	9.8	12.4	26.0	49.4	2.4	(26)	
(27)	61	70	46	71	38	73	10.9	57.5	7.8	15.6	32.2	42.4	2.0	(27)	
(28)	60	71	40	72	34	52	11.6	54.6	10.3	16.3	30.9	40.5	2.0	(28)	
(29)	63	70	44	73	40	18	11.6	58.8	8.7	16.6	26.8	45.5	2.4	(29)	
(30)	61	72	42	71	37	35	11.7	56.4	9.0	16.2	29.8	42.8	2.2	(30)	
(31)	61	70	44	72	36	50	11.3	56.1	9.2	16.1	32.6	40.2	1.9	(31)	
(32)	59	70	44	71	23	17	10.2	55.0	8.4	14.6	35.6	40.0	1.4	(32)	
(33)	56	69	46	64	33	5	9.3	54.1	5.4	13.5	40.6	39.0	1.5	(33)	
(34)	60	68	43	70	40	35	8.8	55.3	8.8	12.9	33.3	43.6	1.9	(34)	
(35)	85	69	40	71	26	50	11.0	54.4	8.9	16.0	31.4	41.9	1.8	(35)	
(36)	62	74	46	72	40	32	13.2	58.1	9.0	17.8	31.5	39.5	2.2	(36)	

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Alfalfa hay, 17% protein.	86.3	13.8	58.8	1:	8.5	18.0	24.4	33.0	2.4	(1)
(2)	—meal.....	87.6	14.7	52.3	2.6	10.3	18.8	26.9	28.9	2.7	(2)
(3)	—meal, excellent quality, extra green....	89.7	10.3	49.4	3.8	8.3	13.9	27.9	38.0	1.6	(3)
(4)	—fed green, all expts..	28.1	4.0	17.1	3.3	2.5	5.1	7.8	11.9	0.8	(4)
(5)	—3d cutting, fed green.	36.9	5.1	21.4	3.2	3.4	6.9	9.8	15.9	0.9	(5)
(6)	—silage.....	25.3	3.1	14.3	3.7	2.3	4.6	8.2	9.3	0.9	(6)
(7)	—silage, prebloom....	21.8	3.1	12.4	3.0	2.1	4.4	6.7	7.7	0.9	(7)
(8)	—silage, early bloom...	30.2	2.7	16.1	4.9	2.6	4.4	11.0	11.3	0.9	(8)
(9)	—silage, half bloom....	32.6	4.4	20.6	3.6	2.7	6.3	8.8	13.7	1.1	(9)
(10)	—silage, sun-wilted....	36.1	4.4	21.2	3.8	3.0	6.6	11.2	14.0	1.3	(10)
(11)	—silage, prebloom, sun-wilted.....	34.6	5.0	21.7	3.3	3.0	7.2	9.8	13.2	1.4	(11)
(12)	—silage, early bloom, sun-wilted.....	35.0	3.2	18.1	4.8	3.0	5.2	12.2	13.5	1.1	(12)
(13)	—silage, half bloom, sun-wilted.....	42.6	5.2	25.9	4.0	2.9	7.4	13.0	18.0	1.3	(13)
(14)	—silage, full bloom, sun-wilted, A. I. V.	36.0	3.6	20.3	4.7	2.8	5.4	12.0	14.8	1.0	(14)
(15)	—silage, molasses added.....	29.3	3.7	17.6	3.7	2.3	5.3	8.1	12.6	1.0	(15)
(16)	—silage, molasses added.....	29.1	3.6	18.2	4.1	2.4	5.3	8.2	11.5	1.7	(16)
(17)	—silage, prebloom, molasses added....	25.3	4.0	16.9	3.2	2.2	5.4	6.5	10.1	1.1	(17)
(18)	—silage, early bloom, molasses added....	26.6	2.1	14.3	5.9	2.3	3.5	9.2	10.9	0.7	(18)
(19)	—silage, early bloom, molasses added....	30.0	3.0	19.9	5.7	2.8	4.7	9.5	10.5	2.5	(19)
(20)	—silage, half bloom, molasses added....	30.6	3.5	17.4	4.0	2.3	5.2	8.7	13.5	0.9	(20)
(21)	—silage, half bloom, molasses added....	31.1	3.5	16.6	3.8	2.2	5.4	9.6	13.0	0.9	(21)
(22)	—silage, sun-wilted, molasses added.....	38.3	4.6	22.8	4.0	3.2	6.8	11.0	16.1	1.2	(22)
(23)	—silage, prebloom, sun-wilted, molasses added.....	38.6	5.7	24.0	3.2	3.5	8.1	9.9	15.7	1.4	(23)
(24)	—silage, early bloom, sun-wilted, molasses added.....	34.0	3.4	19.3	4.7	3.0	5.2	11.0	13.8	1.0	(24)
(25)	—silage, early bloom, slightly sun-wilted, 8-10% molasses added.....	32.7	3.7	19.9	4.5	3.0	5.5	8.6	14.7	0.9	(25)
(26)	—silage, half bloom, sun-wilted, molasses added.....	42.0	4.5	24.4	4.5	3.1	6.8	12.1	18.8	1.2	(26)
(27)	—silage, H <sub>2</sub> PO <sub>4</sub> added.....	30.1	3.7	16.3	3.4	2.4	5.4	9.8	11.6	0.9	(27)
(28)	—silage, H <sub>2</sub> PO <sub>4</sub> added.....	28.6	4.0	16.7	3.2	3.1	5.6	8.2	10.1	1.6	(28)
(29)	—silage, early bloom, H <sub>2</sub> PO <sub>4</sub> added.....	28.8	2.9	17.5	5.0	2.7	4.3	9.9	10.9	1.0	(29)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract			
( 1 )	66	77	75	72	53	8	16.0	68.1	9.9	20.8	28.3	38.2	2.8	( 1 )		
( 2 )	65	78	52	69	61	2	16.8	59.7	11.8	21.5	30.7	32.9	3.1	( 2 )		
( 3 )	60	74	39	72	23	3	11.5	55.1	9.2	15.5	31.1	42.4	1.8	( 3 )		
( 4 )	65	78	44	74	46	14	14.2	60.7	8.9	18.2	27.6	42.3	3.0	( 4 )		
( 5 )	63	74	42	72	38	2	13.8	58.1	9.2	18.6	26.6	43.2	2.4	( 5 )		
( 6 )	60	67	52	61	60	16	12.1	56.4	9.0	18.0	32.3	37.0	3.7	( 6 )		
( 7 )	59	70	50	61	62	9	14.1	56.9	9.5	20.1	30.6	35.6	4.2	( 7 )		
( 8 )	56	62	51	58	58	11	9.0	53.3	8.6	14.5	36.3	37.5	3.1	( 8 )		
( 9 )	66	71	57	70	60	3	13.6	63.2	8.2	19.2	26.9	42.2	3.5	( 9 )		
(10)	61	67	53	64	64	17	12.2	58.7	8.3	18.2	31.0	38.9	3.6	(10)		
(11)	65	70	57	68	67	9	14.5	62.8	8.6	20.7	28.4	38.3	4.0	(11)		
(12)	52	60	48	57	58	5	9.0	51.8	8.6	15.0	35.0	38.2	3.2	(12)		
(13)	62	70	52	67	68	3	12.2	60.9	6.9	17.4	30.6	42.1	3.0	(13)		
(14)	59	66	54	60	62	2	10.9	56.5	7.8	15.1	33.2	41.1	2.8	(14)		
(15)	62	70	49	69	57	37	12.7	60.2	8.0	18.2	27.8	42.5	3.5	(15)		
(16)	63	68	45	71	72	9	12.3	62.5	8.4	18.1	28.1	39.6	5.8	(16)		
(17)	69	74	59	73	69	18	15.7	66.7	8.8	21.2	25.6	40.1	4.3	(17)		
(18)	56	59	54	58	56	3	7.8	53.7	8.5	13.2	34.4	41.2	2.7	(18)		
(19)	63	63	46	73	88	3	9.9	66.2	9.5	15.7	31.6	35.0	8.2	(19)		
(20)	59	66	44	67	51	24	11.3	56.8	7.5	17.1	28.3	44.0	3.1	(20)		
(21)	56	64	41	63	52	3	11.2	53.5	7.0	17.5	31.0	41.7	2.8	(21)		
(22)	62	67	52	67	62	45	11.9	59.4	8.4	17.8	28.6	42.0	3.2	(22)		
(23)	65	70	54	70	65	18	14.7	62.3	9.1	21.0	25.7	40.5	3.7	(23)		
(24)	60	65	52	64	63	9	10.0	56.8	8.9	15.4	32.4	40.4	2.9	(24)		
(25)	65	67	51	73	56	6	11.2	61.0	9.1	16.7	26.3	45.1	2.8	(25)		
(26)	61	65	48	67	57	6	10.6	58.0	7.4	16.3	28.9	44.6	2.8	(26)		
(27)	57	68	45	64	39	14	12.2	54.2	8.0	18.0	32.4	38.5	3.1	(27)		
(28)	61	71	45	66	61	10	14.0	58.4	11.0	19.7	28.7	35.8	5.7	(28)		
(29)	64	68	60	65	71	2	10.1	60.9	9.4	14.8	34.3	38.0	3.5	(29)		

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Alfalfa silage, early bloom, $H_2PO_4$ added	29.1	3.5	16.5	3.7	3.3	5.0	9.3	10.1	1.4	(1)
(2)	—silage, half bloom, $H_2PO_4$ added	29.9	3.6	15.8	3.3	2.3	5.4	9.8	11.4	1.0	(2)
(3)	—silage, half bloom, $H_2PO_4$ added	28.6	3.8	15.4	3.1	2.4	5.3	9.6	10.5	0.8	(3)
(4)	Alfalfa clover grass mixed hay	85.9	6.5	43.8	5.7	6.6	11.4	30.1	36.0	1.8	(4)
(5)	Alfalfa clover timothy mixed hay	86.7	6.4	45.0	6.1	6.5	11.2	30.4	36.7	1.9	(5)
(6)	—mixed silage, full bloom	36.1	3.0	19.8	5.6	2.7	5.2	11.8	15.1	1.3	(6)
(7)	—mixed silage, full bloom, molasses added	35.0	2.8	18.8	5.8	2.8	4.9	11.3	14.8	1.2	(7)
(8)	Alfalfa grass mixed hay	84.5	6.8	44.7	5.6	8.9	11.4	30.5	32.4	1.3	(8)
(9)	—timothy mixed hay	87.6	2.9	43.9	14.1	4.7	6.3	33.9	40.8	1.9	(9)
(10)	Anise seed oil cake	90.8	9.0	67.5	6.5	14.5	16.6	9.7	33.1	16.9	(10)
(11)	Apple pomace, dried	88.5	-1.3	66.3	.....	1.9	4.1	12.6	64.4	5.5	(11)
(12)	—pomace, dried	86.7	-1.0	56.4	.....	3.3	3.7	14.7	60.6	4.4	(12)
(13)	Barley, grain	85.8	8.8	70.7	7.1	2.4	11.7	4.9	65.3	1.5	(13)
(14)	—grain	84.8	8.0	67.1	7.4	2.4	11.4	4.9	64.6	1.4	(14)
(15)	—grain, under 13.5% moisture	86.9	9.0	73.5	7.1	2.4	11.9	4.4	66.5	1.7	(15)
(16)	—grain, under 13.5% moisture	86.8	8.6	70.0	7.1	2.4	12.0	4.4	66.4	1.6	(16)
(17)	—grain, 13.5—16% moisture	85.4	8.7	69.1	6.9	2.5	11.6	5.1	64.8	1.4	(17)
(18)	—grain, 13.5—16% moisture	85.0	8.7	67.1	6.7	2.6	12.1	5.2	63.9	1.2	(18)
(19)	—grain, sample grade, over 16% moisture	82.2	5.3	65.3	11.5	2.0	8.7	4.3	65.5	1.7	(19)
(20)	—grain, under 10% protein	82.2	5.2	65.3	11.6	2.0	8.6	4.3	65.6	1.7	(20)
(21)	—grain, 10% protein	85.4	8.7	67.5	6.8	2.6	12.0	5.0	64.5	1.3	(21)
(22)	—dust	90.5	8.2	47.4	4.7	5.7	13.8	11.0	58.2	1.8	(22)
(23)	Barley oat pea vetch mixed fodder, fed green	25.6	2.9	15.9	4.5	2.1	4.0	6.5	12.3	0.7	(23)
(24)	Bean straw, kidney	88.1	7.8	45.1	4.8	14.7	11.6	27.0	33.8	1.0	(24)
(25)	Bean fodder, mungo, fed green	16.0	2.5	10.1	3.0	2.6	3.1	4.3	5.6	0.4	(25)
(26)	—silage, mungo, dough stage	27.3	2.0	12.3	5.0	7.2	3.8	5.2	9.8	1.3	(26)
(27)	Bean, mungo Guatemala gamagrass mixed fodder, fed green	17.7	1.8	10.3	4.9	3.0	2.3	5.2	6.6	0.6	(27)
(28)	Bean, mungo, napiergrass mixed fodder, fed green	21.0	1.8	11.9	5.4	2.9	2.6	7.1	8.0	0.4	(28)
(29)	Beet, sugar, roots	23.4	-0.4	18.6	.....	1.0	1.1	1.2	20.0	0.1	(29)
(30)	—sugar, roots, dried	93.6	-1.8	71.6	.....	3.8	4.5	4.2	80.9	0.2	(30)
(31)	—pulp, dried	86.2	3.5	62.1	16.4	4.0	7.9	17.2	56.5	0.6	(31)
(32)	—pulp, molasses added, dried	97.3	5.8	70.2	11.0	6.3	8.8	1.4	79.6	1.2	(32)
(33)	Bentgrass clover timothy mixed hay	87.1	5.2	48.6	8.2	6.5	9.9	24.3	44.2	2.2	(33)
(34)	Bermudagrass, immature, dried	91.3	5.5	38.9	6.1	11.4	10.1	16.8	51.7	1.3	(34)
(35)	Bermudagrass knotgrass mixed hay, postbloom	89.8	1.6	49.3	30.0	8.6	4.7	26.8	48.6	1.1	(35)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
							%	%	%	%	%	%	%		
( 1 )	60	70	51	63	60	7	12.0	56.6	11.4	17.2	31.8	34.9	4.7	( 1 )	
( 2 )	56	67	43	63	32	9	12.1	52.7	7.6	18.1	32.7	38.4	3.2	( 2 )	
( 3 )	57	71	38	69	41	3	13.3	54.0	8.3	18.7	33.4	36.7	2.9	( 3 )	
( 4 )	54	57	43	63	42	5	7.6	51.0	7.7	13.3	35.0	41.9	2.1	( 4 )	
( 5 )	55	57	42	65	46	21	7.4	51.9	7.5	12.9	35.1	42.3	2.2	( 5 )	
( 6 )	56	58	50	61	58	9	8.4	54.9	7.6	14.4	32.6	41.8	3.6	( 6 )	
( 7 )	55	56	48	61	59	3	7.9	53.7	7.9	14.1	32.2	42.4	3.4	( 7 )	
( 8 )	59	59	60	58	31	1	8.0	52.9	10.5	13.5	36.1	38.4	1.5	( 8 )	
( 9 )	52	46	50	54	47	8	3.3	50.1	5.4	7.2	38.7	46.5	2.2	( 9 )	
(10)	59	54	3	68	94	4	9.9	74.3	16.0	18.3	10.7	36.4	18.6	(10)	
(11)	74	-33	55	87	37	3	-1.5	74.9	2.1	4.6	14.2	72.9	6.2	(11)	
(12)	65	-29	52	77	32	10	-1.2	65.0	3.8	4.3	17.0	69.8	5.1	(12)	
(13)	83	75	10	91	60	10	10.2	82.4	2.8	13.6	5.7	76.2	1.7	(13)	
(14)	81	70	6	88	63	23	9.4	79.1	2.9	13.5	5.8	76.2	1.6	(14)	
(15)	86	76	22	92	63	3	10.4	84.6	2.8	13.7	5.1	76.4	2.0	(15)	
(16)	81	72	-22	89	88	4	9.9	80.6	2.8	12.8	5.1	76.4	1.9	(16)	
(17)	82	75	4	90	59	7	10.2	80.9	2.9	13.6	6.0	75.9	1.6	(17)	
(18)	81	72	12	88	55	15	10.2	78.9	3.1	14.2	6.1	75.2	1.4	(18)	
(19)	79	60	8	87	69	4	6.4	79.4	2.4	10.6	5.2	79.7	2.1	(19)	
(20)	79	60	8	87	69	4	6.3	79.4	2.4	10.5	5.2	79.8	2.1	(20)	
(21)	81	72	5	88	62	19	10.2	79.0	3.0	14.1	5.9	75.5	1.5	(21)	
(22)	54	60	35	56	67	6	9.1	52.4	6.3	15.2	12.2	64.3	2.0	(22)	
(23)	66	72	53	71	56	2	11.3	62.2	8.3	15.7	25.4	47.8	2.8	(23)	
(24)	61	67	52	67	30	12	8.8	51.2	16.7	13.2	30.6	38.3	1.2	(24)	
(25)	73	82	72	71	51	1	15.9	63.2	16.0	19.4	26.8	35.3	2.5	(25)	
(26)	55	54	48	58	72	4	7.5	45.0	26.4	13.9	19.1	36.0	4.6	(26)	
(27)	67	75	74	60	55	1	9.9	58.2	16.8	13.2	29.5	37.1	3.4	(27)	
(28)	65	70	69	60	44	1	8.8	56.8	13.6	12.6	33.6	38.5	1.7	(28)	
(29)	83	-35	29	93	20	5	-1.6	79.6	4.3	4.6	5.2	85.5	0.4	(29)	
(30)	81	-39	14	92	-393	3	-1.9	76.5	4.1	4.8	4.5	86.4	0.2	(30)	
(31)	77	45	69	86	-139	5	4.1	72.0	4.7	9.2	20.0	65.4	0.7	(31)	
(32)	77	66	86	79	9	2	6.0	72.1	6.5	9.1	1.5	81.7	1.2	(32)	
(33)	59	53	53	63	54	1	6.0	55.8	7.5	11.4	27.9	50.7	2.5	(33)	
(34)	48	54	53	46	27	3	6.0	42.6	12.5	11.1	18.4	56.6	1.4	(34)	
(35)	60	34	64	61	35	3	1.8	54.9	9.6	5.2	29.9	54.1	1.2	(35)	



TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Bluegrass, Kentucky, pasture	25.8	2.9	15.7	4.5	3.1	4.2	6.2	11.3	1.0	(1)
(2)	—fertilized, pasture.....	21.7	3.1	13.6	3.4	2.2	4.1	5.8	8.6	1.0	(2)
(3)	Bluegrass, Kentucky, white clover mixed pasture	28.2	4.9	20.9	3.2	2.4	6.6	5.2	12.4	1.6	(3)
(4)	Bluegrass, Kentucky, white clover redtop mixed hay.....	90.7	19.2	57.8	2.0	9.6	25.6	15.2	36.7	3.6	(4)
(5)	Bluestem hay, pitted, late bloom.....	94.3	0	43.6	0	10.1	2.8	37.0	43.3	1.1	(5)
(6)	Brewers' dried grains.....	90.1	16.0	59.6	2.7	4.5	21.7	16.2	40.4	7.3	(6)
(7)	—wet grains.....	23.8	3.8	15.7	3.1	1.3	5.2	4.0	11.8	1.5	(7)
(8)	Bristlegrass browntop millet crabgrass knotstem pennisetum vinegrass mixed hay, postbloom.....	91.2	2.3	43.1	18.2	9.8	5.1	32.6	42.4	1.3	(8)
(9)	Bristlegrass, yellow, iwarancusagrass rooigrass sorghum mixed hay, postbloom.....	89.9	1.5	46.7	30.0	8.8	4.0	34.9	40.9	1.3	(9)
(10)	Brome hay.....	93.0	2.5	40.5	14.9	9.1	6.0	31.8	44.1	2.0	(10)
(11)	Buckwheat middlings.....	85.3	26.1	72.5	1.8	4.5	23.7	6.6	33.0	7.5	(11)
(12)	Buffalograss, immature, dried	91.8	6.1	50.8	7.3	12.1	11.3	24.1	42.3	2.0	(12)
(13)	Bundleflower, rayado, stems leaves pods, fed green	38.3	2.0	18.8	8.7	2.2	4.4	15.1	15.6	1.0	(13)
(14)	Cactus, pricklypear, dry...	91.9	2.9	54.1	17.4	16.5	4.3	12.5	57.1	1.5	(14)
(15)	—pricklypear, fed green...	12.7	0.4	7.3	18.6	2.7	0.7	1.8	7.3	0.2	(15)
(16)	—pricklypear, fed green...	35.6	0.1	21.1	163.3	6.7	1.1	4.3	23.0	0.5	(16)
(17)	Caraway seed oil meal.....	86.2	12.8	77.2	5.0	6.7	21.5	13.7	30.4	13.9	(17)
(18)	Carpetgrass, tropical, fed green.....	39.9	1.8	27.2	14.5	3.4	3.5	10.4	22.0	0.6	(18)
(19)	Carrots, roots.....	13.2	0.6	11.0	18.2	1.2	1.1	1.3	9.4	0.2	(19)
(20)	Castorbean oil meal with hulls, toxicity extracted.....	86.7	22.7	25.2	0.1	7.5	29.5	35.5	13.2	1.0	(20)
(21)	Chickpea straw, gram.....	90.6	2.2	33.5	14.4	12.0	5.4	40.2	32.5	0.5	(21)
(22)	Chickpeas, gram, seed.....	91.6	12.8	81.5	5.3	3.0	17.9	6.5	61.7	2.5	(22)
(23)	Clover hay, all expts.....	82.1	7.5	48.6	5.5	7.6	11.9	25.6	34.9	2.1	(23)
(24)	—hay.....	81.9	7.1	42.0	4.9	5.6	14.5	26.1	33.9	1.8	(24)
(25)	—hay, full bloom.....	85.5	8.4	54.9	5.5	7.5	12.6	19.6	43.5	2.3	(25)
(26)	—hay, early bloom, dehydrated.....	83.8	6.7	52.0	6.8	6.5	11.1	22.5	41.9	1.8	(26)
(27)	—fed green, all expts.....	18.3	2.2	12.4	4.5	1.9	3.2	4.6	7.8	0.8	(27)
(28)	—late bloom, fed green...	15.4	2.3	9.6	3.2	2.3	3.4	3.1	5.8	0.8	(28)
(29)	—silage, all expts.....	20.6	1.9	12.4	5.4	2.2	3.2	6.6	7.7	0.9	(29)
(30)	—silage, all expts.....	20.8	2.4	13.8	4.8	2.1	3.6	5.4	8.5	1.2	(30)
(31)	—silage, full bloom.....	17.0	2.1	11.8	4.7	1.6	3.0	4.4	6.8	1.2	(31)
(32)	—silage, full bloom, 2d cutting.....	23.4	2.6	15.0	4.8	2.3	4.0	6.1	9.8	1.2	(32)
(33)	—seed screenings.....	89.1	28.8	60.1	1.6	14.1	29.2	10.5	28.4	6.9	(33)
(34)	Clover hay, crimson.....	88.5	10.5	55.2	4.2	6.3	15.0	26.7	38.5	2.0	(34)
(35)	Clover hay, Egyptian.....	87.2	9.7	51.4	4.3	12.3	13.9	18.5	41.5	1.0	(35)
(36)	—fed green.....	15.1	2.2	9.8	3.4	2.4	2.7	2.9	6.7	0.4	(36)



## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
( 1 )	68	63	70	65	51	14	11.1	60.8	12.0	16.3	24.2	43.7	3.8	( 1 )	
( 2 )	67	74	71	62	51	14	14.1	62.8	10.3	19.1	26.5	39.3	4.8	( 2 )	
( 3 )	75	75	76	75	74	2	17.5	74.2	8.4	23.3	18.6	43.9	5.8	( 3 )	
( 4 )	69	75	69	69	34	17	21.2	63.7	10.6	28.2	16.8	40.4	4.0	( 4 )	
( 5 )	51	2	60	48	21	3	0	46.2	10.7	3.0	39.2	45.9	1.2	( 5 )	
( 6 )	60	74	41	55	89	4	17.8	66.1	5.0	24.1	18.0	44.8	8.1	( 6 )	
( 7 )	63	73	39	64	84	2	16.1	66.0	5.4	22.0	17.0	49.4	6.2	( 7 )	
( 8 )	52	44	57	50	38	2	2.5	47.3	10.7	5.6	35.8	46.5	1.4	( 8 )	
( 9 )	57	38	65	53	26	2	1.7	51.9	9.8	4.4	38.8	45.6	1.4	( 9 )	
(10)	47	42	47	49	32	1	2.7	43.5	9.8	6.5	34.2	47.4	2.1	(10)	
(11)	81	91	-5	90	74	2	30.6	85.0	5.3	33.6	7.7	44.6	3.8	(11)	
(12)	62	54	65	62	62	1	6.6	55.3	13.2	12.3	26.2	46.1	2.2	(12)	
(13)	51	44	44	59	47	1	5.1	49.1	5.8	11.5	39.3	41.0	2.4	(13)	
(14)	71	68	48	76	55	1	3.2	58.9	17.9	4.7	13.6	62.2	1.6	(14)	
(15)	71	55	46	78	70	5	2.9	57.1	21.2	5.3	14.1	57.7	1.7	(15)	
(16)	69	12	37	80	77	2	0.4	59.2	18.7	3.0	12.2	64.6	1.5	(16)	
(17)	76	60	84	75	96	4	14.9	89.6	7.8	24.9	15.9	35.3	16.1	(17)	
(18)	72	50	55	84	84	1	4.4	68.1	8.4	8.8	26.1	55.1	1.6	(18)	
(19)	90	50	84	95	105	2	4.4	83.3	9.4	8.7	9.8	70.5	1.6	(19)	
(20)	30	77	-2	10	32	2	26.2	29.1	8.6	34.0	41.0	15.2	1.2	(20)	
(21)	43	40	40	47	0	3	2.4	37.0	13.3	6.0	44.4	35.8	0.5	(21)	
(22)	90	72	166	89	52	2	14.0	89.0	3.3	19.5	7.1	67.4	2.7	(22)	
(23)	63	63	56	69	58	75	9.1	59.2	9.3	14.5	31.2	42.5	2.5	(23)	
(24)	54	49	46	62	47	7	8.7	51.3	6.8	17.7	31.9	41.4	2.2	(24)	
(25)	68	67	50	77	61	3	9.8	64.2	8.8	14.7	22.9	50.9	2.7	(25)	
(26)	66	60	52	76	44	2	8.0	62.0	7.8	13.3	26.8	50.0	2.1	(26)	
(27)	72	70	59	80	66	16	12.2	67.7	10.2	17.5	25.2	42.9	4.2	(27)	
(28)	68	67	53	78	65	2	14.9	62.3	15.2	22.3	19.9	37.3	5.3	(28)	
(29)	64	61	63	63	67	13	9.4	60.0	10.6	15.4	32.2	37.3	4.5	(29)	
(30)	67	67	51	76	78	5	11.5	66.3	9.9	17.2	26.0	41.0	5.9	(30)	
(31)	70	70	52	79	78	2	12.2	69.4	9.7	17.5	25.9	40.0	6.9	(31)	
(32)	66	65	50	74	78	3	11.0	64.1	10.0	17.0	26.0	41.8	5.2	(32)	
(33)	70	78	21	77	85	2	25.6	67.5	15.8	32.8	11.8	31.8	7.8	(33)	
(34)	65	70	58	70	51	1	11.9	62.4	7.1	17.0	30.2	43.4	2.3	(34)	
(35)	68	70	49	77	29	4	11.1	59.0	14.1	15.9	21.2	47.6	1.2	(35)	
(36)	75	81	60	80	50	3	14.7	64.7	15.6	18.2	19.5	43.9	2.8	(36)	

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free ex-tract	Ether ex-tract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Clover hay, red.....	83.3	7.2	48.1	5.7	7.6	11.9	26.2	35.5	2.1	( 1 )
( 2 )	—hay, early bloom.....	84.0	6.8	53.1	6.8	6.8	10.8	23.6	41.1	1.7	( 2 )
( 3 )	—hay, early bloom, dried on riders.....	81.4	11.3	48.7	3.3	8.2	16.0	20.6	34.6	2.0	( 3 )
( 4 )	—hay, half bloom.....	85.6	10.5	55.5	4.3	8.4	15.1	23.5	34.4	4.2	( 4 )
( 5 )	—hay, 1st cutting.....	95.7	9.4	58.6	5.2	8.4	14.8	28.8	40.4	3.3	( 5 )
( 6 )	—hay, 1st cutting, dried on riders.....	82.2	8.8	47.5	4.4	6.7	13.5	22.5	37.2	2.3	( 6 )
( 7 )	—hay, 1st cutting, full bloom, dried on riders.....	82.7	8.8	48.5	4.5	6.4	13.5	23.2	37.2	2.4	( 7 )
( 8 )	—hay, 1st cutting, late bloom, dried on riders.....	82.4	6.4	45.4	6.1	5.6	10.9	23.7	39.8	2.4	( 8 )
( 9 )	—hay, 2d or 3d cutting.....	85.4	7.2	50.3	6.0	5.5	12.1	23.9	36.5	2.4	( 9 )
(10)	—hay, under 25% fiber..	82.2	8.8	47.5	4.4	6.7	13.5	22.5	37.2	2.3	(10)
(11)	—hay, over 28% fiber...	88.8	7.8	52.9	5.8	6.4	13.0	28.9	37.8	2.7	(11)
(12)	—early bloom, fed green..	20.1	2.6	13.8	4.4	2.0	3.5	5.5	8.1	1.0	(12)
(13)	—1st cutting, fed green..	15.9	2.1	11.7	4.7	1.6	2.7	3.8	7.1	0.7	(13)
(14)	—2d cutting, fed green...	21.0	2.2	13.2	4.9	1.9	3.4	5.8	9.2	0.7	(14)
(15)	—silage.....	18.9	1.7	11.2	5.5	2.2	3.0	6.7	6.0	1.0	(15)
(16)	—silage, early bloom.....	28.8	2.3	16.3	6.1	2.6	4.1	8.8	12.3	1.0	(16)
(17)	—silage, A. I. V.....	17.7	2.4	12.9	4.4	1.7	3.2	5.0	6.5	1.3	(17)
(18)	—silage, half bloom, sun-wilted.....	31.3	2.3	17.8	6.7	2.4	4.1	10.4	13.5	0.9	(18)
(19)	—silage, molasses added..	35.0	2.6	20.1	6.8	3.0	4.6	10.8	15.7	0.9	(19)
(20)	—silage, early bloom, molasses added.....	37.7	3.0	22.2	6.4	3.4	5.4	10.3	17.6	1.0	(20)
(21)	—silage, half bloom, molasses added.....	32.3	2.2	18.2	7.3	2.6	3.8	11.0	14.0	0.9	(21)
(22)	—silage, early bloom, H <sub>2</sub> PO <sub>4</sub> added.....	36.9	2.7	20.8	6.9	3.4	5.0	11.1	16.3	1.1	(22)
(23)	Clover grass mixed hay...	91.1	5.7	29.1	4.0	7.1	10.1	31.2	40.6	2.1	(23)
(24)	—mixed hay, weathered..	78.6	2.0	36.9	16.8	5.4	6.3	27.5	38.4	1.0	(24)
(25)	—mixed fodder, fed green	20.6	1.6	13.2	7.5	1.7	2.5	6.5	9.2	0.7	(25)
(26)	—mixed silage, all expts..	20.8	1.4	13.8	9.2	1.9	2.5	6.5	8.9	1.0	(26)
(27)	—mixed silage, early bloom	18.8	1.1	12.4	10.6	2.0	2.1	6.1	7.5	1.1	(27)
(28)	—mixed silage, A. I. V...	19.1	1.5	13.6	8.3	1.5	2.3	5.9	8.4	1.0	(28)
(29)	—mixed silage, full bloom, molasses added.....	29.8	2.0	16.3	7.2	2.2	4.2	9.2	13.3	0.9	(29)
(30)	Clover grass heavy sedge, mixed silage.....	(20.8)	0.1	8.6	117.0	1.7	2.4	6.0	9.9	0.8	(30)
(31)	Clover, red, grass mixed hay	82.8	5.0	51.3	9.3	6.4	8.4	28.3	38.0	1.7	(31)
(32)	Clover, heavy grass mixed hay.....	83.7	3.2	44.5	13.2	5.8	6.3	31.0	39.2	1.4	(32)
(33)	Clover, grass mixed fodder, fed green.....	22.4	1.4	15.3	9.6	1.6	2.3	6.5	11.4	0.6	(33)
(34)	Clover, heavy grass mixed fodder, fed green.....	29.5	1.1	16.7	14.2	1.7	2.3	10.5	14.3	0.6	(34)
(35)	Clover timothy mixed hay, all expts.....	88.2	3.1	48.4	14.6	5.1	7.6	31.2	42.3	2.0	(35)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS							Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	62	60	54	68	58	32	8.6	57.8	9.1	14.3	31.5	42.6	2.5	(1)
(2)	67	63	57	75	53	2	8.1	63.2	8.1	12.9	28.1	48.9	2.0	(2)
(3)	65	71	51	70	58	2	13.9	59.8	10.1	19.6	25.3	42.5	2.5	(3)
(4)	66	70	52	75	73	2	12.3	64.8	9.8	17.6	27.5	40.2	4.9	(4)
(5)	65	63	58	71	52	1	9.8	61.2	8.8	15.5	30.1	42.1	3.5	(5)
(6)	61	65	46	68	61	6	10.7	57.8	8.2	16.4	27.4	45.2	2.8	(6)
(7)	61	65	47	68	65	2	10.6	58.6	7.8	16.3	28.1	44.9	2.9	(7)
(8)	57	59	40	66	60	2	7.8	55.1	6.8	13.2	28.8	48.3	2.9	(8)
(9)	60	59	50	69	65	2	8.4	58.9	6.4	14.2	33.8	42.8	2.8	(9)
(10)	61	65	46	68	61	6	10.7	57.8	8.2	16.4	27.4	45.2	2.8	(10)
(11)	62	60	52	70	61	3	8.8	59.6	7.2	14.6	32.6	42.6	3.0	(11)
(12)	71	72	58	79	75	2	12.7	68.7	9.8	17.6	27.5	40.2	4.9	(12)
(13)	78	76	66	85	71	6	13.0	73.7	10.0	17.1	23.8	44.8	4.3	(13)
(14)	67	65	53	76	58	6	10.7	63.0	8.9	16.4	27.5	43.8	3.4	(14)
(15)	62	58	68	55	72	6	9.1	59.4	11.6	15.7	35.3	32.1	5.3	(15)
(16)	59	56	53	64	64	2	8.0	56.5	9.0	14.2	30.7	42.7	3.4	(16)
(17)	73	75	63	78	78	1	13.5	72.9	9.5	18.0	28.5	36.7	7.3	(17)
(18)	59	56	54	64	64	1	7.4	57.0	7.8	13.2	33.1	43.0	2.9	(18)
(19)	61	57	54	66	61	2	7.4	57.5	8.5	13.0	30.8	45.0	2.7	(19)
(20)	62	56	50	72	60	2	8.0	59.0	8.9	14.2	27.4	46.7	2.8	(20)
(21)	59	58	57	61	62	1	6.3	56.4	8.1	11.8	34.2	43.2	2.7	(21)
(22)	59	53	54	65	65	1	7.2	56.4	9.3	13.5	30.0	44.3	2.9	(22)
(23)	59	57	24	34	42	48	6.3	31.9	7.8	11.1	34.3	44.5	2.3	(23)
(24)	50	33	58	48	21	2	2.6	47.0	6.9	8.0	35.0	48.8	1.3	(24)
(25)	68	63	70	69	47	10	7.6	64.0	8.4	12.0	31.6	44.7	3.3	(25)
(26)	68	55	74	66	76	11	6.5	66.3	9.0	11.8	31.4	43.0	4.8	(26)
(27)	68	50	79	64	74	4	5.7	66.2	10.7	11.4	32.4	39.9	5.6	(27)
(28)	71	65	70	74	78	2	7.7	71.1	8.1	11.8	30.8	44.0	5.3	(28)
(29)	57	47	46	66	67	2	6.7	54.8	7.3	14.2	31.0	44.5	3.0	(29)
(30)	42	3	44	50	52	2	0.1	41.3	8.3	11.7	29.0	47.0	4.0	(30)
(31)	66	59	68	66	52	8	6.0	61.9	7.7	10.2	34.2	45.9	2.0	(31)
(32)	56	50	56	57	51	8	3.8	53.2	6.9	7.5	37.0	46.9	1.7	(32)
(33)	71	62	66	77	60	4	6.4	68.3	7.1	10.4	29.2	50.6	2.7	(33)
(34)	58	48	54	64	55	8	3.7	56.7	5.9	7.8	35.5	48.6	2.2	(34)
(35)	57	41	55	61	52	17	3.5	54.9	5.8	8.6	35.4	47.9	2.3	(35)

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Clover heavy timothy mixed hay.....	87.7	3.3	44.7	12.3	4.7	7.0	29.7	44.2	2.1	(1)
(2)	Clover timothy mixed hay, under 30% fiber.....	87.1	4.0	48.8	11.3	5.6	8.3	28.8	42.3	2.1	(2)
(3)	—mixed hay, over 30% fiber.....	88.9	2.6	46.1	17.0	4.4	6.6	32.4	43.4	2.1	(3)
(4)	—mixed hay, under 7% protein.....	87.4	4.1	64.8	14.6	4.4	5.7	31.6	43.7	2.0	(4)
(5)	—mixed hay, 7-9% protein.....	88.3	5.7	64.6	10.5	4.8	7.5	30.2	43.7	2.1	(5)
(6)	—hay, 9% protein.....	88.4	5.1	51.0	9.0	6.3	10.0	29.9	40.2	2.0	(6)
(7)	—mixed silage, molasses added.....	32.9	2.6	21.3	7.0	2.4	4.9	8.1	15.0	2.5	(7)
(8)	—mixed silage, full bloom, molasses added.....	32.1	2.5	19.3	6.8	3.0	4.5	8.6	14.8	1.2	(8)
(9)	—mixed silage, late bloom, molasses added.....	39.2	2.8	22.9	7.1	3.4	5.6	10.4	17.9	1.9	(9)
(10)	—mixed silage, late bloom, $H_2PO_4$ added.....	31.9	2.8	17.7	5.2	2.7	5.0	9.0	12.9	2.3	(10)
(11)	Clover, red, timothy mixed hay.....	88.4	2.1	47.2	21.7	4.4	6.1	32.6	43.6	1.7	(11)
(12)	Clover, white, grass mixed, immature, dehydrated.....	92.7	17.1	60.5	2.5	10.4	22.8	16.8	39.5	3.2	(12)
(13)	—mixed fodder, fed green.....	34.0	0.3	20.7	63.0	1.7	1.5	9.6	20.7	0.5	(13)
(14)	Cocoa meal.....	93.7	9.1	57.3	5.3	5.7	24.6	5.4	42.4	15.6	(14)
(15)	Coconut oil meal.....	86.6	19.6	72.1	2.7	6.0	24.2	13.3	35.7	7.4	(15)
(16)	Corn fodder, dry.....	79.5	2.8	52.9	17.8	4.3	6.1	20.5	46.6	2.0	(16)
(17)	—fodder, prebloom, dehydrated.....	94.0	4.1	60.7	13.8	8.5	8.4	31.9	43.0	2.2	(17)
(18)	—fodder, milk stage, dried.....	63.5	1.0	41.4	39.7	3.6	3.5	21.7	31.5	3.2	(18)
(19)	—fodder, dough stage, dried.....	51.4	2.4	36.6	14.2	3.3	4.2	15.6	27.4	0.9	(19)
(20)	—fodder, mature, dried.....	82.1	3.3	56.2	16.1	4.4	6.6	18.6	50.6	1.9	(20)
(21)	—fodder, under 20% moisture.....	82.7	1.9	54.5	17.3	4.3	6.8	16.1	53.5	2.0	(21)
(22)	—fodder, 20-40% moisture.....	65.9	1.8	42.1	22.0	3.6	4.3	20.8	34.8	2.4	(22)
(23)	—fodder, 40-60% moisture.....	45.0	2.1	32.7	14.6	2.5	3.6	13.6	24.4	0.9	(23)
(24)	—fodder, flint, dough stage, dry.....	49.5	1.4	31.8	22.2	2.2	3.6	14.3	27.9	1.5	(24)
(25)	—husks, mature, dry.....	91.9	1.0	66.5	66.0	3.4	3.3	32.8	51.6	0.8	(25)
(26)	—husks and leaves, dry.....	91.1	3.2	58.0	17.4	6.7	6.6	30.0	45.5	2.3	(26)
(27)	—leaves, mature, dry.....	92.6	1.8	58.1	31.3	10.5	5.3	27.0	47.6	2.2	(27)
(28)	—stover, dry.....	83.7	2.0	48.8	23.2	6.1	5.0	28.3	42.7	1.6	(28)
(29)	—stover, dry.....	87.8	1.2	50.4	39.1	5.4	4.5	31.9	45.0	1.0	(29)
(30)	—stover, mature, dry.....	81.6	2.2	46.5	20.4	7.7	5.9	25.2	41.9	0.9	(30)
(31)	—stover, mature, dry.....	87.8	1.8	55.9	29.3	5.9	4.4	30.5	46.0	1.0	(31)
(32)	—stover pith removed, chopped, dry.....	90.8	3.8	58.8	14.4	4.0	6.4	28.7	48.9	2.8	(32)
(33)	—stover pith removed, chopped, steamed.....	90.8	2.4	51.6	12.5	4.0	6.4	28.7	48.9	2.8	(33)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	53	48	51	55	40	9	3.8	51.0	5.4	8.0	33.9	50.3	2.4	( 1 )	
( 2 )	58	48	54	63	54	12	4.6	56.0	6.4	9.5	33.0	48.7	2.4	( 2 )	
( 3 )	53	39	53	56	44	14	2.9	51.9	5.0	7.4	36.5	48.7	2.4	( 3 )	
( 4 )	56	73	76	76	75	10	4.7	74.1	5.0	6.5	36.2	50.0	2.3	( 4 )	
( 5 )	52	75	75	75	74	10	6.4	73.2	5.4	8.5	34.2	49.5	2.4	( 5 )	
( 6 )	60	51	57	65	58	6	5.8	57.7	7.0	11.3	33.8	45.6	2.3	( 6 )	
( 7 )	62	54	58	66	72	7	8.0	64.7	7.3	14.9	24.5	45.7	7.6	( 7 )	
( 8 )	63	55	63	67	58	2	7.8	60.2	9.5	14.1	26.7	46.0	3.7	( 8 )	
( 9 )	60	50	53	66	64	3	7.2	58.3	8.7	14.3	26.6	45.6	4.8	( 9 )	
(10)	54	57	50	54	66	3	8.9	55.6	8.6	15.6	28.2	40.3	7.3	(10)	
(11)	55	34	54	59	47	8	2.4	53.4	5.0	6.9	36.9	49.3	1.9	(11)	
(12)	72	75	73	75	22	3	18.4	65.3	11.2	24.6	18.1	42.6	3.5	(12)	
(13)	63	22	50	72	56	4	1.0	60.8	5.1	4.3	28.2	60.9	1.5	(13)	
(14)	45	37	..	40	89	5	9.7	61.2	6.1	26.3	5.8	45.1	16.7	(14)	
(15)	78	81	63	78	98	4	22.6	83.3	6.9	27.9	15.4	41.3	8.5	(15)	
(16)	69	46	69	70	73	26	3.5	66.5	5.4	7.7	25.7	58.7	2.5	(16)	
(17)	69	49	71	72	60	2	4.4	64.6	9.0	8.9	33.9	45.9	2.3	(17)	
(18)	64	29	70	63	75	2	1.6	65.2	5.7	5.5	34.2	49.6	5.0	(18)	
(19)	75	57	80	74	72	2	4.7	71.2	6.5	8.2	30.4	53.1	1.8	(19)	
(20)	70	50	70	73	71	12	4.0	68.5	5.4	8.0	22.6	61.7	2.3	(20)	
(21)	68	44	68	70	70	14	3.6	65.9	5.2	8.2	19.5	64.7	2.4	(21)	
(22)	68	42	66	65	74	6	2.8	63.9	5.5	6.6	31.6	52.7	3.6	(22)	
(23)	75	59	75	77	80	6	4.7	72.7	5.5	7.9	30.2	54.5	1.9	(23)	
(24)	64	38	72	63	75	2	2.8	64.3	4.4	7.3	28.8	56.4	3.1	(24)	
(25)	75	30	80	75	32	2	1.1	72.4	3.7	3.6	35.7	56.1	0.9	(25)	
(26)	67	48	73	66	58	4	3.5	63.7	7.4	7.2	32.9	50.0	2.5	(26)	
(27)	69	34	78	68	56	2	1.9	62.7	11.3	5.7	29.2	51.4	2.4	(27)	
(28)	61	40	67	60	61	18	2.4	58.3	7.3	6.0	33.8	51.0	1.9	(28)	
(29)	60	28	71	57	39	6	1.4	57.4	6.2	5.1	36.3	51.3	1.1	(29)	
(30)	62	37	70	61	56	8	2.7	57.0	9.4	7.2	30.9	51.4	1.1	(30)	
(31)	67	42	76	64	66	4	2.1	63.7	6.7	5.0	34.7	52.5	1.1	(31)	
(32)	64	60	61	66	83	3	4.2	64.8	4.4	7.0	31.6	53.9	3.1	(32)	
(33)	56	60	48	59	80	3	2.6	56.8	4.4	7.0	31.6	53.9	3.1	(33)	

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Corn stubble (stalk below the ear, no leaves), mature, dry.....	53.3	0.4	36.1	97.2	2.6	1.8	20.5	27.3	1.1	(1)
(2)	—tops, dry.....	86.1	2.2	50.4	21.7	7.4	5.7	27.9	42.8	2.3	(2)
(3)	—tops, mature, dry.....	84.0	1.0	32.8	31.8	6.3	4.5	28.6	42.4	2.2	(3)
(4)	—cannery refuse, fed green.....	16.7	0.1	5.3	57.2	0.9	1.3	5.0	9.2	0.3	(4)
(5)	—fodder, fed green.....	18.9	1.3	13.0	9.2	1.6	1.9	5.3	9.7	0.4	(5)
(6)	—fodder, fed green.....	24.6	1.3	16.3	12.1	1.3	2.0	5.4	15.2	0.7	(6)
(7)	—fodder, mature, fed green.....	22.8	1.3	16.8	11.9	1.3	1.8	7.1	12.2	0.4	(7)
(8)	—silage, all expts.....	23.8	0.8	15.2	18.2	1.5	1.8	6.4	13.4	0.7	(8)
(9)	—silage.....	23.1	1.0	16.3	15.5	1.4	2.0	6.2	12.7	0.8	(9)
(10)	—silage, milk stage.....	21.1	0.8	14.9	18.4	1.1	1.8	6.7	10.8	0.7	(10)
(11)	—silage, dough stage.....	28.2	1.0	18.9	18.5	1.5	2.1	7.3	16.3	1.0	(11)
(12)	—silage, dough stage.....	30.5	1.1	21.0	17.3	2.2	2.5	6.9	18.0	0.9	(12)
(13)	—silage, mature.....	23.3	1.2	16.7	12.6	1.8	1.9	6.8	11.8	1.0	(13)
(14)	—silage, steamed.....	21.4	0.1	13.6	161.9	1.4	1.7	4.6	12.9	0.8	(14)
(15)	—silage, flint, dough stage.....	23.1	1.2	16.8	13.4	1.0	2.0	5.5	13.5	1.1	(15)
(16)	—stover silage, dough stage.....	26.5	0.6	15.0	22.9	1.7	1.7	9.1	13.4	0.6	(16)
(17)	—stover silage, mature.....	26.7	0.7	14.6	21.2	2.5	1.7	8.7	13.3	0.5	(17)
(18)	—ear silage, ears and husks, dough stage...	42.8	1.8	32.1	16.8	0.9	3.3	5.0	31.9	1.7	(18)
(19)	—cannery refuse silage.....	22.5	1.2	16.8	12.7	1.3	2.2	5.1	12.2	1.7	(19)
(20)	—grain.....	87.7	7.2	79.5	10.0	1.3	9.6	2.5	70.3	4.0	(20)
(21)	—grain.....	86.7	5.7	74.4	12.1	1.4	9.0	2.0	71.2	3.1	(21)
(22)	—grain, under 4% fat...	87.2	5.5	75.6	12.7	1.5	8.6	2.1	71.8	3.2	(22)
(23)	—grain, 4% fat.....	86.2	5.8	76.7	12.3	1.4	9.3	2.0	69.1	4.4	(23)
(24)	—grain, under 14% moisture.....	87.2	5.9	78.0	12.1	1.4	9.3	1.9	70.5	4.1	(24)
(25)	—grain, 14-15.5% moisture.....	85.8	4.9	67.0	12.8	1.2	8.7	2.1	69.9	3.9	(25)
(26)	—grain, 17.5-20% moisture.....	81.6	5.5	67.8	11.1	1.1	9.6	1.5	65.6	3.8	(26)
(27)	—grain, under 9% protein.....	87.4	5.2	74.6	13.5	1.4	8.6	2.1	71.6	3.7	(27)
(28)	—grain, 9% protein.....	86.0	6.8	77.5	10.4	1.4	9.9	1.9	68.5	4.3	(28)
(29)	—bran, very high fiber ..	90.5	2.9	49.8	16.1	1.3	5.6	26.8	55.3	1.5	(29)
(30)	—gluten feed.....	89.3	24.6	74.5	2.0	5.1	28.6	6.6	46.2	2.8	(30)
(31)	—oil meal, very low protein.....	94.4	9.9	76.5	6.7	4.6	15.7	6.4	59.8	7.9	(31)
(32)	Corn soybean mixed silage ..	20.9	1.2	15.0	11.2	1.3	2.0	5.4	11.5	0.7	(32)
(33)	Cotton bolly refuse, dry...	88.8	0.5	38.1	70.4	5.2	8.9	36.9	35.7	2.1	(33)
(34)	Cottonseed hulls.....	88.4	0.3	38.1	152.9	2.9	4.2	46.9	31.9	2.5	(34)
(35)	—hulls.....	87.9	-1.9	41.7	.....	2.0	4.7	43.8	33.8	3.6	(35)
(36)	—hulls, with some meal...	86.9	3.0	40.3	12.3	2.5	8.4	32.5	40.7	2.8	(36)
(37)	—whole, low protein, high fiber.....	92.5	10.7	75.8	6.1	4.4	17.0	24.5	28.7	17.9	(37)
(38)	—whole, pressed.....	89.1	17.2	48.9	1.8	5.5	24.6	21.0	33.1	4.9	(38)
(39)	—whole, roasted.....	90.7	7.6	73.0	8.6	2.3	16.1	24.0	25.8	22.5	(39)
(40)	—feed, all expt.....	90.6	24.1	63.8	1.6	5.8	30.2	14.7	31.7	8.2	(40)
(41)	—feed.....	89.6	26.5	61.0	1.3	5.7	34.5	10.9	30.4	8.1	(41)
(42)	—feed, high fiber.....	92.5	17.9	73.6	3.1	6.0	21.1	22.3	34.6	8.5	(42)



## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein %	Total dig. nutrients %	Ash %	Crude protein %	Crude fiber %	N-free extract %	Ether extract %		
( 1 )	69	21	73	69	80	2	0.7	67.8	4.9	3.3	38.5	51.3	2.0	( 1 )	
( 2 )	62	39	71	58	67	4	2.6	58.5	8.6	6.6	32.4	49.7	2.7	( 2 )	
( 3 )	58	22	20	54	64	2	1.2	39.0	7.5	5.4	34.0	50.5	2.6	( 3 )	
( 4 )	32	7	25	40	44	2	0.6	32.0	5.2	7.9	30.0	54.9	2.0	( 4 )	
( 5 )	74	69	74	74	66	10	6.8	68.7	8.7	9.8	27.9	51.4	2.2	( 5 )	
( 6 )	68	61	48	74	83	1	5.1	66.4	5.2	8.3	22.1	61.7	2.7	( 6 )	
( 7 )	76	73	75	77	83	2	5.7	73.7	5.8	7.8	31.3	53.2	1.9	( 7 )	
( 8 )	67	45	64	69	70	119	3.3	64.0	6.4	7.4	26.9	56.4	2.9	( 8 )	
( 9 )	72	49	72	74	79	55	4.3	70.5	6.0	8.7	27.0	54.8	3.5	( 9 )	
(10)	70	44	71	72	76	4	3.6	70.8	5.2	8.3	31.8	51.6	3.1	(10)	
(11)	68	47	62	72	75	14	3.4	67.0	5.3	7.3	26.0	58.0	3.4	(11)	
(12)	70	45	65	76	81	2	3.7	68.5	7.1	8.3	22.5	59.3	2.8	(12)	
(13)	73	66	74	72	82	2	5.3	71.6	7.6	8.0	29.2	50.8	4.4	(13)	
(14)	64	5	63	71	79	2	0.4	63.5	6.4	7.8	21.4	60.7	3.7	(14)	
(15)	71	59	69	72	86	2	5.1	72.9	4.5	8.6	24.0	58.0	4.9	(15)	
(16)	61	37	62	58	71	8	2.4	56.6	6.4	6.4	34.4	50.6	2.2	(16)	
(17)	59	38	67	56	60	8	2.5	54.8	9.2	6.5	32.6	49.7	2.0	(17)	
(18)	72	54	34	80	80	8	4.2	74.9	2.2	7.8	11.6	74.4	4.0	(18)	
(19)	71	56	70	71	87	1	5.4	74.6	5.9	9.7	22.8	54.0	7.6	(19)	
(20)	87	75	19	91	87	6	8.2	90.7	1.5	11.0	2.8	80.1	4.6	(20)	
(21)	84	63	13	88	83	40	6.6	85.8	1.6	10.4	2.3	82.1	3.6	(21)	
(22)	84	64	49	88	81	18	6.3	86.7	1.7	9.9	2.4	82.3	3.7	(22)	
(23)	83	62	83	88	85	22	6.7	89.0	1.6	10.8	2.3	80.2	5.1	(23)	
(24)	86	64	37	90	86	24	6.8	89.5	1.6	10.7	2.2	80.8	4.7	(24)	
(25)	75	56	32	78	78	4	5.7	78.1	1.4	10.1	2.4	81.5	4.6	(25)	
(26)	79	58	-178	87	92	2	6.8	83.1	1.4	11.8	1.8	80.4	4.6	(26)	
(27)	82	60	28	87	80	26	5.9	85.4	1.6	9.8	2.4	82.0	4.2	(27)	
(28)	86	69	-16	91	89	14	7.9	90.1	1.6	11.5	2.2	79.7	5.0	(28)	
(29)	54	52	26	68	67	1	3.2	55.0	1.4	6.2	29.6	61.1	1.7	(29)	
(30)	86	86	70	88	74	7	27.5	83.4	5.7	32.0	7.4	51.8	3.1	(30)	
(31)	74	63	21	80	98	8	10.5	81.0	4.9	16.6	6.8	63.3	8.4	(31)	
(32)	72	62	60	80	88	1	5.9	71.8	6.4	9.5	25.9	55.0	3.2	(32)	
(33)	44	6	50	46	55	2	0.6	42.9	5.8	10.0	41.6	40.2	2.4	(33)	
(34)	43	6	48	34	80	7	0.3	43.1	3.3	4.7	53.1	36.1	2.8	(34)	
(35)	45	-41	47	50	76	9	-2.2	47.4	2.3	5.4	49.8	38.4	4.1	(35)	
(36)	44	36	31	54	84	3	3.5	46.4	2.9	9.7	37.4	46.8	3.2	(36)	
(37)	63	63	58	52	89	21	11.6	81.9	4.8	18.4	26.5	30.9	19.4	(37)	
(38)	52	70	22	52	90	4	19.3	54.9	6.2	27.6	23.6	37.1	5.5	(38)	
(39)	60	47	66	51	72	2	8.4	80.5	2.5	17.8	26.5	28.4	24.8	(39)	
(40)	66	30	25	59	93	3	26.6	70.4	6.4	33.3	16.2	35.0	9.1	(40)	
(41)	62	77	..	59	91	2	29.6	68.1	6.4	38.5	12.2	33.9	9.0	(41)	
(42)	73	85	74	59	98	1	19.4	79.6	6.5	22.8	24.1	37.4	9.2	(42)	



TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Cottonseed meal, all expts...	90.5	34.2	79.1	1.3	6.7	42.2	6.2	25.2	10.2	(1)
(2)	—meal, under 10% fat...	89.6	31.1	79.2	1.5	6.5	43.2	7.0	25.1	7.8	(2)
(3)	—meal, 11% fat...	90.8	35.1	78.9	1.2	6.8	41.9	5.8	25.1	11.2	(3)
(4)	—meal, 36% protein, low fiber	91.0	29.1	65.0	1.2	5.9	39.3	7.4	32.0	6.4	(4)
(5)	—meal, 36% protein, low fiber	91.4	30.7	86.1	1.8	6.1	38.9	6.6	28.7	11.1	(5)
(6)	—meal, 43% protein, low fiber	89.0	37.2	75.3	1.0	7.6	44.3	5.3	20.9	10.9	(6)
(7)	—meal, 45% protein, low fiber	91.6	37.2	71.9	0.9	6.6	46.5	6.8	24.7	7.0	(7)
(8)	Cowpea hay, dough stage, high fiber	92.7	7.3	55.8	6.6	10.6	12.0	34.9	33.6	1.6	(8)
(9)	—silage	21.4	1.8	12.5	5.8	2.5	3.2	5.9	9.2	0.6	(9)
(10)	Dayflower fodder, fed green	12.1	0.9	7.7	7.9	1.7	1.3	3.3	5.6	0.2	(10)
(11)	Dogtoothgrass hay	85.7	3.3	43.1	12.0	8.0	6.8	30.6	39.1	1.2	(11)
(12)	—hay, 2d cutting	82.4	3.1	40.5	12.1	8.2	6.6	27.5	37.1	3.0	(12)
(13)	Dogtoothgrass, giant, fed green	(20.0)	0.8	8.9	10.1	2.4	1.6	7.0	8.6	0.4	(13)
(14)	Fennel seed oil meal	89.2	6.1	68.7	10.3	9.9	16.0	13.9	34.5	14.9	(14)
(15)	Fish meal, tuna	90.1	44.3	60.5	0.4	19.8	58.3	0.7	3.9	7.4	(15)
(16)	Flax plant by-product, dry	90.2	5.3	44.2	7.3	7.2	8.3	35.6	35.1	4.0	(16)
(17)	Gamagrass, Guatemala, 1st cutting, fed green	21.9	1.2	11.5	9.0	2.2	2.1	7.7	9.4	0.5	(17)
(18)	Gamagrass, Guatemala, velvetbean mixed fodder, fed green	24.5	2.2	12.7	4.8	3.9	3.3	8.7	8.2	0.4	(18)
(19)	Grape marc meal, molasses added	78.7	2.1	30.8	13.7	8.7	10.0	21.8	33.2	5.0	(19)
(20)	Grass mixed hay, all expts.	91.2	1.1	44.1	38.6	8.6	4.8	32.6	43.7	1.5	(20)
(21)	—mixed hay, poor quality	92.2	0.5	43.3	93.0	9.0	3.3	34.4	44.4	1.1	(21)
(22)	—mixed hay, late bloom, poor quality	93.4	0.4	44.4	127.3	10.5	2.9	34.0	45.1	0.9	(22)
(23)	—mixed hay, overripe, poor quality	89.5	0.7	41.8	57.4	7.9	3.8	33.0	43.3	1.5	(23)
(24)	—mixed hay, 2d cutting	89.6	6.6	52.9	7.0	7.4	11.0	24.6	43.2	3.4	(24)
(25)	—mixed hay, under 25% fiber	88.8	12.2	58.7	3.8	8.3	17.8	19.4	39.9	3.4	(25)
(26)	—mixed hay, over 33% fiber	92.2	0.5	43.3	93.0	9.0	3.3	34.4	44.4	1.1	(26)
(27)	—mixed, immature, dehydrated	89.0	14.8	62.1	3.2	8.5	20.6	16.6	39.8	3.5	(27)
(28)	—mixed, immature, dried	(89.0)	9.7	61.1	5.3	9.7	13.5	24.8	37.2	3.8	(28)
(29)	—mixed, early bloom, fed green, British Isles	26.1	2.1	17.1	7.1	2.0	3.5	7.4	12.7	0.5	(29)
(30)	—mixed, pasture or immature, fed green, Eastern United States	24.9	4.1	17.1	3.1	2.6	5.5	5.1	10.7	1.0	(30)
(31)	—mixed, fed green, Europe	15.7	1.9	10.6	4.6	1.5	2.6	3.8	7.2	0.6	(31)
(32)	—mixed, full bloom, fed green, Europe	16.9	1.6	11.3	6.2	1.5	2.3	4.3	8.1	0.7	(32)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS							Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	63	81	57	80	92	11	37.8	87.4	7.4	46.6	6.8	27.9	11.3	(1)
(2)	53	72	105	99	91	3	34.7	88.4	7.3	48.2	7.8	28.0	8.7	(2)
(3)	67	84	39	73	92	8	38.7	86.9	7.5	46.1	6.4	27.7	12.3	(3)
(4)	68	74	17	71	83	5	32.0	71.4	6.5	43.2	8.1	35.2	7.0	(4)
(5)	88	79	115	92	86	5	33.6	94.2	6.7	42.6	7.2	31.4	12.1	(5)
(6)	76	84	3	68	97	4	41.8	84.6	8.5	49.8	6.0	23.5	12.2	(6)
(7)	74	80	20	74	96	2	40.6	78.5	7.2	50.8	7.4	27.0	7.6	(7)
(8)	67	61	67	70	43	2	7.9	60.2	11.4	13.0	37.7	36.2	1.7	(8)
(9)	64	57	52	72	63	4	8.6	58.2	11.2	15.1	27.7	43.1	2.9	(9)
(10)	72	65	64	79	54	2	7.1	63.3	13.9	10.9	27.0	46.1	2.1	(10)
(11)	55	49	56	56	28	8	3.9	50.3	9.3	7.9	35.7	45.7	1.4	(11)
(12)	51	47	55	48	67	2	3.8	49.2	10.0	8.0	33.4	45.0	3.6	(12)
(13)	49	50	53	45	61	4	4.0	44.4	12.0	8.0	34.8	43.4	1.8	(13)
(14)	65	38	45	72	94	4	6.8	77.0	11.1	17.9	15.6	38.7	16.7	(14)
(15)	72	76	..	..	97	1	49.2	67.1	22.0	64.7	0.8	4.3	8.2	(15)
(16)	49	64	48	43	75	2	5.9	49.0	8.0	9.2	39.5	38.9	4.4	(16)
(17)	57	56	61	54	53	12	5.3	52.6	10.1	9.4	35.2	43.1	2.2	(17)
(18)	61	68	64	54	58	1	9.0	52.0	15.9	13.3	35.5	33.7	1.6	(18)
(19)	40	21	30	52	44	2	2.7	39.2	11.0	12.7	27.7	42.3	6.3	(19)
(20)	54	23	62	50	28	13	1.2	48.4	9.4	5.3	35.7	48.0	1.6	(20)
(21)	53	14	62	47	29	9	0.5	47.0	9.8	3.6	37.3	48.1	1.2	(21)
(22)	53	12	62	50	17	3	0.4	47.5	11.2	3.1	36.4	48.3	1.0	(22)
(23)	52	19	60	46	40	3	0.8	46.7	8.8	4.2	36.9	48.4	1.7	(23)
(24)	63	60	68	63	32	2	7.4	59.1	8.3	12.3	27.4	48.2	3.8	(24)
(25)	71	68	71	75	38	15	13.7	66.1	9.4	20.1	21.8	44.9	3.8	(25)
(26)	53	14	62	47	29	9	0.5	47.0	9.8	3.6	37.3	48.1	1.2	(26)
(27)	75	72	73	80	40	11	16.6	69.8	9.5	23.1	18.7	44.8	3.9	(27)
(28)	73	72	77	73	60	1	10.9	68.7	10.9	15.2	27.9	41.7	4.3	(28)
(29)	70	60	75	72	23	2	8.0	65.5	7.5	13.4	28.5	48.7	1.9	(29)
(30)	75	75	74	77	42	9	16.6	68.7	10.4	22.1	20.4	42.9	4.2	(30)
(31)	72	72	70	74	53	6	12.0	67.3	9.8	16.6	24.1	45.4	4.1	(31)
(32)	71	68	65	76	54	2	9.2	67.0	9.1	13.6	25.5	47.9	3.9	(32)

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
1)	Grass, mixed, late bloom, fed green, Europe...	15.0	2.0	10.2	4.0	1.5	2.7	3.5	6.7	0.6	( 1)
( 2)	—silage, all expts.....	24.3	1.8	15.9	7.7	2.6	3.1	7.3	10.5	0.8	( 2)
( 3)	—silage, early bloom, A. I. V.....	26.0	2.1	17.5	7.5	2.4	3.2	7.7	12.0	0.7	( 3)
( 4)	—silage, early bloom, British Isles.....	23.4	1.8	16.6	8.2	2.2	2.8	7.3	10.3	0.8	( 4)
( 5)	—silage, 2d cutting, British Isles.....	(29.3)	2.5	17.9	6.0	3.4	4.0	7.6	13.6	0.7	( 5)
( 6)	—silage, early bloom, New Zealand.....	23.4	1.2	15.1	11.3	2.7	2.6	8.7	8.1	1.3	( 6)
( 7)	Grass legume mixed hay...	86.3	6.5	46.9	6.3	6.3	11.1	28.0	38.8	2.1	( 7)
( 8)	—mixed fodder, fed green	23.3	2.2	14.6	5.5	2.2	3.2	6.7	10.4	0.8	( 8)
( 9)	Guar fodder, prebloom, fed green.....	19.2	2.4	9.5	3.0	3.3	3.1	4.4	8.0	0.4	( 9)
(10)	Guineagrass, fed green.....	24.2	0.9	12.3	12.4	3.0	1.5	8.7	10.6	0.4	(10)
(11)	Hay, late bloom, British Isles	82.8	3.3	48.7	13.9	6.0	7.1	27.7	41.0	1.0	(11)
(12)	—2d cutting, British Isles (87.0)	87.0	8.0	54.5	5.8	9.2	12.2	22.8	40.5	2.3	(12)
(13)	—East Africa.....	89.2	3.7	43.5	10.9	9.2	7.0	31.9	39.6	1.5	(13)
(14)	—postbloom, East Africa	89.2	4.1	50.6	11.2	9.5	6.7	32.7	38.4	1.9	(14)
(15)	—mature, East Africa...	89.2	3.3	44.0	12.4	9.1	7.0	31.8	40.1	1.2	(15)
(16)	—2d cutting, East Africa (91.0)	91.0	4.1	39.9	8.8	9.1	6.9	33.1	40.4	1.5	(16)
(17)	—Eastern Canada.....	89.2	6.5	47.6	6.3	7.0	11.2	30.5	38.4	2.1	(17)
(18)	—mixed, Eastern United States.....	88.0	5.3	50.8	8.6	5.8	10.4	30.8	39.4	1.6	(18)
(19)	—meadow, Europe.....	85.2	4.7	50.8	9.8	6.8	8.7	25.3	42.2	2.2	(19)
(20)	—meadow, 2d and 3d cutting, Europe.....	85.4	7.4	51.7	6.0	9.0	12.4	21.5	39.3	3.2	(20)
(21)	—mature, India..... (87.0)	87.0	0.04	42.5	976.4	8.8	2.1	30.9	44.2	1.0	(21)
(22)	—prairie, Kansas.....	90.9	0.6	50.6	76.4	7.8	3.6	29.9	47.3	2.3	(22)
(23)	—New England.....	89.6	4.6	55.9	11.1	5.6	8.7	29.2	43.1	3.0	(23)
(24)	—prairie, North Dakota..	89.8	1.6	48.0	28.8	6.7	5.7	30.0	43.7	3.7	(24)
(25)	—Western mixed, Washington.....	85.6	3.4	47.2	13.0	6.2	7.5	30.8	39.4	1.7	(25)
(26)	Hominy feed.....	88.0	6.7	85.2	11.7	2.5	10.0	4.5	63.3	7.7	(26)
(27)	Itchgrass goldplume rhapsis mixed hay.....	93.3	0.9	47.0	51.0	7.1	3.4	36.9	44.7	1.2	(27)
(28)	Japanesemillet hay, dehydrated.....	89.1	7.2	60.3	7.4	9.3	12.0	20.2	45.4	2.2	(28)
(29)	Kale, marrow, dry.....	85.4	9.9	47.6	3.8	16.4	14.5	16.0	36.5	2.0	(29)
(30)	—fed green.....	11.3	1.9	7.4	2.8	1.9	2.4	1.5	5.0	0.5	(30)
(31)	—marrow, fed green.....	14.6	1.4	10.2	6.5	2.1	1.8	2.1	8.1	0.5	(31)
(32)	Kangaroo grass tanglehead mixed hay, late bloom	92.4	0.6	44.6	73.3	7.4	3.3	41.5	38.4	1.8	(32)
(33)	Kapok oil meal, 22% protein (87.0)	87.0	9.2	40.3	3.4	7.7	22.4	19.0	33.0	4.9	(33)
(34)	Leadtree, fodder, whitepopinac, dough stage, fed green.....	30.7	4.8	17.2	2.6	2.7	7.4	7.4	12.4	0.8	(34)
(35)	Leaves, rosewood, fed green	28.4	4.7	30.2	5.4	2.9	5.1	5.6	13.7	1.1	(35)
(36)	—silage, rosewood.....	24.6	1.8	9.1	4.1	4.5	3.4	7.4	8.4	0.9	(36)
(37)	Lespedeza hay, Korean, prebloom.....	(87.0)	5.3	50.4	8.5	4.6	10.8	28.0	40.8	2.8	(37)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%						%	
( 1 )	72	74	72	74	52	4	13.5	67.8	10.2	18.2	23.4	43.9	4.3	( 1 )	
( 2 )	71	60	78	70	55	12	7.6	65.5	10.5	12.6	30.2	43.5	3.2	( 2 )	
( 3 )	72	63	79	70	65	2	7.9	67.4	9.3	12.5	29.8	45.7	2.7	( 3 )	
( 4 )	74	64	81	75	66	4	7.7	70.9	9.5	12.0	31.4	43.8	3.3	( 4 )	
( 5 )	68	63	73	68	36	4	8.7	61.0	11.6	13.8	25.8	46.5	2.3	( 5 )	
( 6 )	69	47	83	62	64	2	5.3	64.4	11.6	11.3	37.0	34.6	5.5	( 6 )	
( 7 )	57	58	40	69	53	4	7.5	54.3	7.3	12.9	32.5	44.9	2.4	( 7 )	
( 8 )	66	70	60	72	46	2	9.6	62.6	9.4	13.7	28.9	44.5	3.5	( 8 )	
( 9 )	59	77	26	70	39	2	12.3	49.6	17.0	16.0	22.7	42.4	1.9	( 9 )	
(10)	57	59	57	57	46	7	3.8	50.7	12.6	6.4	36.0	43.5	1.5	(10)	
(11)	64	46	70	62	28	4	4.0	58.8	7.2	8.6	33.4	49.6	1.2	(11)	
(12)	69	66	74	68	40	4	9.2	62.7	10.6	14.0	26.2	46.6	2.6	(12)	
(13)	54	52	59	49	50	36	4.1	48.8	10.3	7.9	35.8	44.3	1.7	(13)	
(14)	61	62	65	58	69	6	4.6	56.7	10.7	7.5	36.7	43.0	2.1	(14)	
(15)	54	47	62	49	47	16	3.7	49.3	10.2	7.8	35.6	45.0	1.4	(15)	
(16)	47	59	48	44	67	2	4.5	43.9	10.0	7.6	36.4	44.4	1.6	(16)	
(17)	57	58	44	66	50	20	7.3	53.4	7.8	12.6	34.2	43.1	2.3	(17)	
(18)	60	51	63	61	56	6	6.0	57.7	6.6	11.8	35.0	44.8	1.8	(18)	
(19)	63	54	63	66	47	147	5.5	59.6	8.0	10.2	29.7	49.5	2.6	(19)	
(20)	65	60	65	67	54	6	8.7	60.5	10.5	14.5	25.2	46.1	3.7	(20)	
(21)	54	2	63	50	39	9	0.05	48.9	10.1	2.4	35.5	50.8	1.2	(21)	
(22)	59	18	61	61	57	1	0.7	55.7	8.6	4.0	32.9	52.0	2.5	(22)	
(23)	66	53	69	66	40	2	5.1	62.4	6.2	9.7	32.6	48.1	3.4	(23)	
(24)	56	28	61	58	33	20	1.8	53.4	7.5	6.4	33.4	48.6	4.1	(24)	
(25)	58	45	57	62	50	6	4.0	55.2	7.2	8.8	36.0	46.0	2.0	(25)	
(26)	89	67	79	92	96	2	7.6	96.8	2.8	11.4	5.1	71.9	8.8	(26)	
(27)	54	27	59	52	40	6	1.0	50.4	7.6	3.6	39.6	47.9	1.3	(27)	
(28)	73	60	75	76	69	4	8.1	67.7	10.4	13.5	22.7	50.9	2.5	(28)	
(29)	68	68	53	77	25	1	11.6	55.7	19.2	17.0	18.7	42.7	2.4	(29)	
(30)	74	81	59	76	66	4	17.2	65.7	16.4	21.2	13.6	44.1	4.7	(30)	
(31)	78	75	48	88	66	4	9.4	70.2	14.1	12.5	14.4	55.7	3.3	(31)	
(32)	51	18	65	40	42	4	0.6	48.3	8.0	3.6	44.9	41.6	1.9	(32)	
(33)	46	41	11	71	51	2	10.6	46.3	8.9	25.8	21.8	37.9	5.6	(33)	
(34)	60	65	35	74	36	1	15.7	56.0	8.9	24.2	24.2	40.0	2.7	(34)	
(35)	112	93	91	127	122	2	16.7	106.5	10.2	18.0	19.7	48.1	4.0	(35)	
(36)	44	52	34	50	28	4	7.3	36.8	18.2	14.0	30.1	34.1	3.6	(36)	
(37)	60	49	54	69	29	4	6.1	57.9	5.3	12.4	32.2	46.9	3.2	(37)	

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free ex-tract	Ether ex-tract	
( 1 )	Lespedeza hay, postbloom. . .	87.0	4.7	38.0	7.0	4.7	11.6	32.2	36.1	2.4	( 1 )
( 2 )	Lespedeza seed. . . . .	90.0	26.1	61.8	1.4	5.4	33.9	10.7	32.7	7.3	( 2 )
( 3 )	Linseed oil meal, old process	90.1	33.3	75.8	1.3	5.1	37.8	6.8	34.1	6.3	( 3 )
( 4 )	—oil meal, old process, all expts. . . . .	90.6	28.1	73.8	1.6	5.6	33.1	8.0	34.5	9.4	( 4 )
( 5 )	—oil meal, old process, under 10% fat. . . . .	89.1	28.2	69.5	1.5	5.8	33.6	8.2	34.2	7.3	( 5 )
( 6 )	—oil meal, old process, 10% fat. . . . .	92.0	27.5	77.1	1.8	5.3	32.4	7.6	35.0	11.7	( 6 )
( 7 )	—oil meal, 26% protein. . .	82.8	23.1	69.3	2.0	7.0	26.8	7.6	33.0	8.4	( 7 )
( 8 )	—oil meal, 29% protein. . .	91.9	26.8	77.0	1.9	5.2	31.9	7.8	35.7	11.3	( 8 )
( 9 )	—oil meal, 32% protein. . .	91.9	27.6	77.5	1.8	5.4	32.4	7.9	35.0	11.2	( 9 )
(10)	—oil meal, 33% protein. . .	93.5	28.4	77.9	1.7	5.2	33.5	9.0	35.2	10.6	(10)
(11)	—oil meal, 34% protein. . .	88.6	29.2	63.8	1.2	5.8	35.2	8.1	33.1	6.4	(11)
(12)	—oil meal, 37% protein. . .	90.4	33.1	73.5	1.2	5.1	38.5	6.6	34.1	6.1	(12)
(13)	Lupine fodder, sweet, fed green. . . . .	11.4	1.5	7.0	3.7	1.4	2.0	3.0	4.7	0.3	(13)
(14)	—fodder, sweet green, full bloom, fed green. . . .	10.3	1.4	6.4	3.6	1.4	1.9	2.5	4.2	0.3	(14)
(15)	—fodder, sweet, late bloom, fed green. . . .	12.4	1.6	7.7	3.8	1.5	2.2	3.5	4.9	0.3	(15)
(16)	—silage, A. I. V. . . . .	17.2	1.9	9.6	4.0	1.9	2.6	6.3	6.0	0.4	(16)
(17)	—silage, late bloom, A. I. V. . . . .	17.5	2.4	10.7	3.5	1.8	3.2	5.7	6.3	0.5	(17)
(18)	—silage, dough stage. . . .	17.0	1.5	8.7	4.6	2.1	2.2	6.9	5.4	0.4	(18)
(19)	Mangels, roots. . . . .	10.6	1.0	8.2	7.0	1.1	1.4	0.9	7.1	0.1	(19)
(20)	—roots. . . . .	10.4	0.8	8.1	8.6	1.1	1.3	0.8	7.2	0.0	(20)
(21)	Mesquite bean, common, low protein. . . . .	89.2	5.9	57.8	8.7	3.7	8.5	20.7	55.0	1.3	(21)
(22)	Milk, cow's (Calves). . . .	12.3	3.2	15.8	3.9	0.8	3.3	.....	4.6	3.6	(22)
(23)	—partly skimmed (Calves)	10.7	3.3	12.6	2.8	0.7	3.5	.....	4.2	2.3	(23)
(24)	—skimmed, centrifugal (Calves). . . . .	9.1	3.2	8.2	1.5	0.7	3.4	.....	5.0	0.0	(24)
(25)	—skimmed, fat added and emulsified (Calves). . .	9.8	3.2	9.5	2.0	1.0	3.3	.....	4.7	0.8	(25)
(26)	Molasses, very high protein. .	77.1	17.1	65.1	2.8	7.2	15.3	.....	54.6	.....	(26)
(27)	—cane. . . . .	75.4	2.3	72.4	30.2	4.6	4.1	.....	66.7	.....	(27)
(28)	Napiergrass, fed green. . . .	21.4	1.4	13.5	8.6	2.1	2.2	6.6	9.7	0.8	(28)
(29)	—very immature, fed green. . . . .	20.8	1.7	13.6	7.1	1.7	2.6	6.0	9.6	0.9	(29)
(30)	Napiergrass velvetbean mixed fodder, fed green. . .	22.4	1.6	11.2	6.0	2.3	2.7	8.6	8.5	0.3	(30)
(31)	Oat hay. . . . .	93.5	2.6	56.6	20.4	7.6	5.5	32.1	46.3	2.0	(31)
(32)	—hay, dehydrated. . . . .	87.1	9.2	61.6	5.7	8.3	13.9	20.3	41.6	3.0	(32)
(33)	—hay, milk stage. . . . .	96.0	2.2	58.3	25.5	6.9	5.0	34.0	48.3	1.8	(33)
(34)	—hulls. . . . .	92.7	1.1	35.8	30.7	5.7	3.2	30.9	51.9	1.0	(34)
(35)	—hulls. . . . .	92.6	0.9	28.1	28.7	5.7	3.1	31.3	51.5	1.0	(35)
(36)	—mill feed. . . . .	92.8	3.0	34.2	10.3	6.2	5.3	28.6	50.8	1.9	(36)
(37)	—mill feed. . . . .	91.8	2.2	23.1	9.5	6.0	4.2	26.9	53.4	1.3	(37)
(38)	—straw. . . . .	89.8	1.3	47.1	33.5	7.0	4.1	34.6	41.6	2.5	(38)
(39)	—straw. . . . .	89.1	1.3	46.7	33.0	7.2	4.3	35.5	39.5	2.6	(39)
(40)	—fodder, fed green. . . . .	16.2	1.2	11.3	8.8	1.7	1.6	4.3	8.2	0.4	(40)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	46	41	50	46	10	4	5.4	43.7	5.4	13.3	37.0	41.5	2.8	( 1 )	
( 2 )	68	77	28	76	48	9	29.0	68.7	6.0	37.7	11.9	36.3	8.1	( 2 )	
( 3 )	80	88	28	82	89	7	37.0	84.1	5.7	42.0	7.5	37.8	7.0	( 3 )	
( 4 )	74	85	-11	78	93	93	31.0	81.5	6.2	36.5	8.8	38.1	10.4	( 4 )	
( 5 )	75	84	-10	78	94	30	31.7	78.	6.5	37.7	9.2	38.4	8.2	( 5 )	
( 6 )	73	85	-11	75	92	29	29.9	83.8	5.8	35.2	8.3	38.0	12.7	( 6 )	
( 7 )	78	86	23	82	92	6	27.9	83.7	8.4	32.4	9.2	39.8	10.2	( 7 )	
( 8 )	73	84	-15	77	94	11	29.2	83.8	5.7	34.7	8.5	38.8	12.3	( 8 )	
( 9 )	74	85	-2	77	92	17	30.0	84.3	5.9	35.3	8.6	38.0	12.2	( 9 )	
(10)	45	85	10	75	93	8	30.4	83.3	5.6	35.8	9.6	37.7	11.3	(10)	
(11)	73	83	-64	78	97	12	33.0	72.0	6.6	39.7	9.1	37.4	7.2	(11)	
(12)	76	86	26	77	90	5	36.6	81.3	5.6	42.6	7.3	37.7	6.8	(12)	
(13)	68	74	56	74	61	11	13.2	61.7	12.6	17.8	26.5	40.2	2.9	(13)	
(14)	69	74	57	74	65	5	13.5	62.0	13.6	18.2	24.4	40.7	3.1	(14)	
(15)	68	74	56	74	57	6	12.9	61.7	11.8	17.4	28.2	39.8	2.8	(15)	
(16)	61	72	52	65	60	13	11.1	55.8	11.2	15.4	36.8	34.1	2.5	(16)	
(17)	66	75	54	71	59	6	13.5	60.9	10.0	18.0	32.4	36.7	2.9	(17)	
(18)	57	69	50	59	60	7	9.0	51.0	12.3	13.1	40.6	31.9	2.1	(18)	
(19)	88	74	54	95	-11	8	9.8	77.7	10.8	13.2	8.3	67.0	0.7	(19)	
(20)	87	66	64	94	-10	39	8.1	77.8	10.6	12.3	7.8	68.8	0.5	(20)	
(21)	66	70	54	70	75	1	6.6	64.8	4.2	9.5	23.2	61.6	1.5	(21)	
(22)	98	96	..	99	100	10	25.9	128.3	6.4	27.0	.....	37.7	28.9	(22)	
(23)	98	95	..	100	99	2	31.2	117.7	6.7	32.8	.....	39.3	21.2	(23)	
(24)	98	96	..	100	38	1	35.6	90.3	8.2	37.1	.....	54.3	0.4	(24)	
(25)	98	95	..	100	93	1	32.3	97.4	9.9	34.0	.....	47.9	8.2	(25)	
(26)	109	112	..	88	..	1	22.2	84.5	9.4	19.8	.....	70.8	.....	(26)	
(27)	102	57	..	105	..	2	3.1	96.0	6.1	5.4	.....	88.5	.....	(27)	
(28)	67	63	68	68	59	44	6.6	63.1	9.9	10.4	30.7	45.4	3.6	(28)	
(29)	68	64	68	70	58	16	8.1	65.6	8.2	12.6	28.9	45.9	4.4	(29)	
(30)	55	58	56	53	39	1	7.1	49.8	10.3	12.2	38.4	37.7	1.4	(30)	
(31)	64	48	65	65	66	22	2.8	60.5	8.1	5.9	34.3	49.6	2.1	(31)	
(32)	75	66	76	78	68	4	10.6	70.7	9.5	16.0	23.3	47.8	3.4	(32)	
(33)	64	44	64	65	71	4	2.3	60.7	7.2	5.2	35.4	50.3	1.9	(33)	
(34)	41	36	40	40	69	19	1.2	38.6	6.2	3.4	33.3	56.0	1.1	(34)	
(35)	32	30	33	30	58	25	1.0	30.3	6.2	3.4	33.8	55.5	1.1	(35)	
(36)	38	57	34	36	75	8	3.2	36.8	6.7	5.7	30.8	54.8	2.0	(36)	
(37)	27	52	18	30	3	4	2.4	25.2	6.5	4.6	29.3	58.2	1.4	(37)	
(38)	55	33	57	56	49	8	1.5	52.5	7.8	4.6	38.5	46.3	2.8	(38)	
(39)	55	32	59	56	38	13	1.5	52.4	8.1	4.8	39.8	44.4	2.9	(39)	
(40)	77	72	76	79	50	2	7.1	69.7	10.8	9.9	26.6	50.5	2.2	(40)	



TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Oat silage.....	32.4	1.7	19.0	10.6	2.7	2.9	11.5	14.3	1.0	(1)
(2)	—silage, dough stage....	37.8	2.4	21.2	7.7	2.6	3.9	11.4	18.4	1.5	(2)
(3)	—silage, dough stage, molasses added.....	38.0	2.2	20.9	8.5	2.9	3.9	11.0	18.7	1.5	(3)
(4)	—grain.....	87.3	8.9	65.5	6.4	3.4	11.9	10.5	58.0	3.5	(4)
(5)	—grain.....	85.5	8.4	59.6	6.1	3.0	11.4	10.5	57.3	3.3	(5)
(6)	—grain, under 14.5% moisture.....	86.1	8.7	59.5	5.8	3.2	11.6	10.9	57.4	3.0	(6)
(7)	—grain, sample grade, over 16% moisture.....	83.3	7.6	60.8	7.0	2.2	10.5	8.8	57.1	4.7	(7)
(8)	—grain, under 11% protein.....	84.8	7.5	59.0	6.8	2.6	10.5	10.5	57.6	3.6	(8)
(9)	—grain, 11% protein.....	86.0	9.1	60.0	5.6	3.3	12.1	10.5	56.9	3.2	(9)
(10)	—mill or low grade.....	88.1	8.5	54.1	5.4	3.9	11.7	13.7	53.5	5.3	(10)
(11)	—shorts.....	88.0	9.4	54.8	4.8	3.4	14.3	7.2	58.5	4.6	(11)
(12)	Oat vetch mixed hay.....	(85.3)	4.8	55.9	10.6	4.4	5.5	28.5	43.3	3.6	(12)
(13)	—mixed hay meal.....	(85.3)	4.6	54.4	10.8	4.6	5.4	28.3	43.4	3.6	(13)
(14)	—mixed fodder, fed green.....	9.4	0.8	5.6	6.2	0.9	1.2	2.7	4.4	0.2	(14)
(15)	Orchardgrass hay.....	85.6	5.0	49.8	8.9	5.5	8.4	33.7	34.7	3.3	(15)
(16)	Palm kernel oil meal, high fiber.....	92.4	15.2	77.8	4.1	4.2	18.4	23.3	43.6	2.9	(16)
(17)	Paragrass, fed green.....	23.4	1.3	12.7	8.9	2.8	2.0	7.8	10.4	0.4	(17)
(18)	—late bloom, fed green.....	25.6	1.3	14.7	10.8	3.2	2.1	8.8	11.0	0.5	(18)
(19)	Paspalum, fed green.....	20.8	0.7	10.2	14.6	3.1	1.3	7.2	8.9	0.3	(19)
(20)	Pea straw.....	90.1	3.1	51.3	16.0	6.1	5.8	30.8	45.4	2.0	(20)
(21)	—feed.....	89.9	14.7	78.4	4.3	3.1	18.0	23.0	44.2	1.6	(21)
(22)	Peanut oil meal, 39% protein.....	90.2	36.7	80.3	1.2	5.3	39.1	5.3	34.3	6.2	(22)
(23)	—oil meal, 45% protein.....	87.0	41.8	76.3	0.8	5.1	46.4	5.1	23.6	6.8	(23)
(24)	Pearlmillet fodder, milk stage, fed green.....	21.6	0.9	12.8	12.9	2.4	1.5	6.9	10.5	0.3	(24)
(25)	Pigeonpea fodder, milk stage, fed green.....	49.7	6.5	33.6	4.2	2.8	9.4	14.8	20.1	2.6	(25)
(26)	Pineapple pulp, dried.....	84.5	0.6	63.0	112.0	2.5	3.7	19.4	57.2	1.7	(26)
(27)	Poppy seed oil meal.....	89.1	29.7	67.4	1.3	12.9	37.6	10.6	18.6	9.4	(27)
(28)	Potato tubers.....	22.6	1.4	18.0	11.3	1.2	2.6	0.5	18.3	0.0	(28)
(29)	—cooked.....	26.2	-0.4	17.1	.....	1.5	2.0	0.8	21.8	0.1	(29)
(30)	—silage, steamed.....	23.9	-0.2	16.5	.....	1.2	1.8	0.6	20.3	0.0	(30)
(31)	—flakes or flour.....	87.9	3.3	71.8	20.4	4.4	8.6	2.2	72.4	0.3	(31)
(32)	—spent residue, dried.....	88.8	9.5	44.8	3.7	12.3	22.6	6.6	46.7	0.6	(32)
(33)	Pumpkins, entire.....	6.1	0.8	5.3	5.7	0.6	1.1	0.8	2.9	0.7	(33)
(34)	Rape, bird, fed green.....	14.9	0.8	6.4	6.5	2.3	1.3	4.0	6.9	0.4	(34)
(35)	Rape seed oil meal.....	88.4	26.5	73.5	1.8	6.9	30.9	9.0	30.0	11.6	(35)
(36)	Rhodesgrass, fed green.....	28.3	1.3	16.4	11.2	3.8	2.3	10.7	11.4	0.6	(36)
(37)	Rice straw.....	93.8	0.1	44.7	793.5	15.9	2.6	30.4	44.1	0.8	(37)
(38)	—straw.....	(88.0)	0.3	38.9	123.9	12.3	3.3	29.6	41.7	1.1	(38)
(39)	—bran.....	90.1	6.5	55.1	7.5	11.4	9.9	14.8	44.1	9.9	(39)
(40)	—feed.....	87.8	8.9	70.5	6.9	8.4	13.7	5.7	47.4	12.6	(40)
(41)	—polishings.....	88.5	7.3	77.6	9.6	3.5	11.1	3.8	64.2	5.9	(41)
(42)	Russianhistle, tumbling, dry.....	86.2	5.8	40.3	5.9	15.7	9.2	22.5	37.9	0.9	(42)
(43)	Ryegrass hay.....	83.0	3.2	49.9	14.3	6.5	6.8	28.2	40.0	1.5	(43)



## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract			
							%	%						%	%	
( 1 )	62	57	65	60	57	15	5.1	58.6	8.4	8.9	35.5	44.1	3.1	( 1 )		
( 2 )	57	62	51	58	68	7	6.4	56.1	7.0	10.4	30.1	48.4	4.1	( 2 )		
( 3 )	56	57	48	60	64	6	5.8	54.9	7.6	10.2	28.9	49.4	3.9	( 3 )		
( 4 )	74	75	30	81	82	14	10.2	75.0	3.9	13.6	12.0	66.5	4.0	( 4 )		
( 5 )	68	74	13	76	84	25	9.8	69.7	3.5	13.3	12.3	67.0	3.9	( 5 )		
( 6 )	68	75	14	76	84	17	10.1	69.1	3.7	13.5	12.7	66.6	3.5	( 6 )		
( 7 )	69	72	6	77	84	4	9.1	73.0	2.7	12.6	10.6	68.5	5.6	( 7 )		
( 8 )	68	72	10	76	83	9	8.9	69.6	3.1	12.4	12.4	67.9	4.2	( 8 )		
( 9 )	68	75	14	76	86	12	10.6	69.8	3.8	14.1	12.2	66.2	3.7	( 9 )		
(10)	62	72	17	60	94	2	9.6	61.4	4.4	13.3	15.5	60.8	6.0	(10)		
(11)	60	66	29	61	74	2	10.7	62.3	3.9	16.2	8.2	66.5	5.2	(11)		
(12)	65	88	63	63	72	2	5.6	65.5	5.2	6.4	33.4	50.8	4.2	(12)		
(13)	63	86	61	61	75	2	5.4	63.8	5.4	6.3	33.2	50.9	4.2	(13)		
(14)	64	76	63	64	64	13	8.3	59.8	9.2	12.4	28.8	47.6	2.0	(14)		
(15)	60	60	63	56	56	2	5.9	58.2	6.4	9.8	39.4	40.6	3.8	(15)		
(16)	82	83	84	81	118	2	16.5	84.2	4.5	19.9	25.2	47.3	3.1	(16)		
(17)	60	65	59	60	62	13	5.5	54.1	12.1	8.4	33.3	44.6	1.6	(17)		
(18)	65	60	67	64	52	7	4.9	57.6	12.6	8.1	34.2	43.3	1.8	(18)		
(19)	56	50	61	52	81	1	3.2	49.1	14.8	6.3	34.6	42.9	1.4	(19)		
(20)	60	53	53	66	56	5	3.4	57.5	6.8	6.4	34.2	50.4	2.2	(20)		
(21)	89	82	87	93	63	3	16.4	87.2	3.4	20.0	25.6	49.2	1.3	(21)		
(22)	86	94	55	79	97	3	40.7	89.0	5.9	43.3	5.9	38.0	6.9	(22)		
(23)	85	90	32	83	91	4	48.0	88.3	5.9	53.3	5.9	27.1	7.8	(23)		
(24)	65	62	60	69	67	3	4.3	59.4	10.9	6.9	31.8	48.9	1.5	(24)		
(25)	67	69	50	78	69	1	13.0	67.6	5.7	18.9	29.7	40.4	5.3	(25)		
(26)	76	15	79	79	53	1	0.7	74.6	3.0	4.4	23.0	67.6	2.0	(26)		
(27)	75	79	61	64	92	3	33.3	75.7	14.5	42.2	11.9	20.9	10.5	(27)		
(28)	85	55	-23	91	0.8	9	6.4	79.4	5.1	11.7	2.3	80.7	0.2	(28)		
(29)	70	-20	0	80	0	3	-1.6	65.1	5.6	7.8	3.0	83.3	0.3	(29)		
(30)	74	-10	0	83	0	2	-0.8	69.2	5.2	7.7	2.7	84.3	0.1	(30)		
(31)	86	39	-8	94	96	16	3.8	81.7	5.0	9.8	2.5	82.4	0.3	(31)		
(32)	60	42	54	74	-201	2	10.7	50.5	13.8	25.5	7.4	52.6	0.7	(32)		
(33)	82	70	68	89	90	2	12.0	86.6	9.3	18.5	13.3	47.6	10.3	(33)		
(34)	49	65	28	54	73	12	5.7	42.7	15.6	8.8	26.6	46.2	2.3	(34)		
(35)	75	86	24	72	89	6	30.0	83.2	7.8	34.9	10.2	34.0	13.1	(35)		
(36)	64	58	70	60	50	1	4.6	56.8	13.1	8.0	37.2	39.7	2.0	(36)		
(37)	57	2	66	54	44	13	0.1	47.7	17.0	2.8	32.4	46.9	0.9	(37)		
(38)	51	9	62	46	44	2	0.3	44.2	14.0	3.8	33.6	47.4	1.2	(38)		
(39)	62	65	13	78	55	2	7.2	61.1	12.6	11.0	16.4	49.0	11.0	(39)		
(40)	72	65	-19	82	84	8	10.1	80.2	9.6	15.6	6.5	53.9	14.4	(40)		
(41)	85	66	22	93	73	2	8.2	87.7	3.9	12.5	4.3	72.6	6.7	(41)		
(42)	56	63	45	62	40	1	6.7	46.7	18.2	10.7	26.1	43.9	1.1	(42)		
(43)	64	48	68	64	55	6	3.9	60.1	7.8	8.2	34.0	48.2	1.8	(43)		

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Ryegrass, fed green.....	21.5	1.3	14.5	10.4	1.6	2.0	6.6	10.7	0.6	(1)
(2)	Rye straw, treated with NaOH, wet.....	16.5	0.2	11.2	56.4	0.5	0.3	8.9	6.5	0.3	(2)
(3)	—fodder, dough stage, fed green.....	15.6	2.0	11.5	4.7	1.3	2.5	4.7	6.3	0.8	(3)
(4)	—distillers' dried grains.....	93.7	6.9	50.0	6.3	1.6	16.0	14.4	49.4	12.3	(4)
(5)	—feed.....	85.1	11.8	61.1	4.2	5.7	15.1	4.8	56.9	2.6	(5)
(6)	—middlings.....	87.4	15.1	75.8	4.0	4.3	18.0	4.6	57.0	3.5	(6)
(7)	Saltbush, fourwing, fed green.....	29.7	5.5	10.3	0.9	7.5	7.2	3.8	10.2	1.0	(7)
(8)	Sanbur hay, India, early bloom.....	94.8	4.9	45.4	8.2	10.9	8.5	31.2	43.3	0.9	(8)
(9)	Screenings, grain.....	90.8	9.4	61.0	5.5	8.0	14.5	13.5	47.2	7.6	(9)
(10)	Soapweed fodder.....	47.9	1.2	23.0	17.9	3.6	2.8	15.3	25.3	0.9	(10)
(11)	Sorghum fodder, kafir, mature, dry.....	88.2	2.2	54.4	24.0	4.1	5.7	20.8	55.2	2.4	(11)
(12)	—Sudangrass hay.....	87.4	2.9	53.7	17.8	6.5	6.6	27.4	45.1	1.8	(12)
(13)	—Sudangrass hay, full bloom.....	86.0	3.3	53.9	15.4	7.5	7.0	25.5	44.1	1.9	(13)
(14)	—Sudangrass hay, post-bloom.....	90.1	2.1	54.2	25.4	4.3	5.9	31.4	46.8	1.7	(14)
(15)	—Sudangrass hay, dehydrated.....	87.7	9.7	58.6	5.0	9.3	15.3	19.4	41.5	2.2	(15)
(16)	—Sudangrass hay, pre-bloom, dehydrated.....	86.4	9.1	58.9	5.5	8.6	14.2	18.7	42.5	2.4	(16)
(17)	—head chops, kafir.....	78.4	0.9	22.5	25.8	2.4	8.4	6.9	53.3	2.4	(17)
(18)	—leaves, dough stage, dry.....	87.6	6.0	59.0	8.9	4.5	9.6	24.0	44.9	4.6	(18)
(19)	—stover, kafir, dry.....	81.6	1.6	46.5	26.9	7.9	4.9	27.2	40.0	1.6	(19)
(20)	—fodder, juar, fed green, India.....	34.8	0.3	18.5	54.3	2.9	1.3	10.8	19.2	0.6	(20)
(21)	—fodder, late bloom, fed green.....	33.0	0.4	18.2	42.9	2.9	1.1	11.5	17.0	0.5	(21)
(22)	—fodder, mature, fed green.....	39.2	0.2	21.8	101.8	3.3	1.4	10.7	23.3	0.5	(22)
(23)	—fodder, sorgho or sweet, dough stage, fed green.....	29.4	1.0	21.8	21.5	2.0	1.8	8.6	15.9	1.1	(23)
(24)	—fodder, Sudangrass, dough stage, fed green.....	35.4	0.4	16.8	40.2	3.6	1.4	11.3	18.5	0.6	(24)
(25)	—mill refuse, fed green.....	26.9	-0.8	9.5	.....	1.3	0.6	11.5	13.0	0.5	(25)
(26)	—silage, sorgho or sweet, dough stage.....	29.4	0.7	16.7	24.0	2.0	2.5	7.1	17.1	0.7	(26)
(27)	—grain, broomcorn, cracked.....	84.9	4.4	61.6	12.9	2.7	10.5	5.3	62.8	3.6	(27)
(28)	—grain, kafir, ground.....	86.8	5.7	62.4	10.0	1.6	9.8	2.2	70.7	2.5	(28)
(29)	—grain, kafir, whole.....	87.3	4.5	35.3	6.7	1.1	11.2	1.6	70.5	2.9	(29)
(30)	—grain, milo.....	88.7	5.7	71.0	11.4	1.6	10.0	2.4	72.3	2.4	(30)
(31)	Soybean hay.....	90.3	8.3	46.1	4.6	7.4	13.4	35.1	32.7	1.7	(31)
(32)	—hay, late bloom.....	82.6	11.2	50.4	3.5	6.4	15.5	25.5	32.6	2.6	(32)
(33)	—hay, dough stage.....	86.1	11.9	52.0	3.4	7.1	16.4	22.2	39.2	1.2	(33)
(34)	—hay, dehydrated.....	89.9	7.9	50.1	5.3	7.4	13.4	27.1	39.9	2.1	(34)
(35)	—hay, dough stage, dehydrated.....	86.4	11.1	56.2	4.0	7.0	15.7	18.7	43.3	1.7	(35)
(36)	—hay, under 25% fiber.....	86.6	10.0	54.6	4.5	6.9	14.7	20.0	43.4	1.6	(36)
(37)	—hay, 25-35% fiber.....	89.9	10.6	49.5	3.7	7.6	14.9	30.7	33.6	3.1	(37)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS							Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	70	62	70	73	62	9	5.9	67.4	7.6	9.5	30.6	49.5	2.8	(1)
(2)	70	59	79	56	49	2	1.2	67.7	2.8	2.0	53.8	39.8	1.6	(2)
(3)	75	80	80	71	74	2	12.9	73.8	8.5	16.1	30.0	40.5	4.9	(3)
(4)	48	43	4	47	70	2	7.4	53.4	1.7	17.1	15.4	52.7	13.1	(4)
(5)	74	78	-23	82	64	6	13.9	71.8	6.7	17.8	5.6	66.8	3.1	(5)
(6)	86	84	59	90	84	1	17.3	86.7	4.9	20.6	5.3	65.2	4.0	(6)
(7)	51	77	4	62	-70	2	18.6	34.8	25.4	24.2	12.7	34.2	3.5	(7)
(8)	54	58	58	50	37	3	5.2	47.9	11.5	9.0	32.9	45.6	1.0	(8)
(9)	66	65	18	81	64	2	10.4	67.2	8.8	16.0	14.9	51.9	8.4	(9)
(10)	56	43	34	73	-12	4	2.5	48.0	7.5	5.9	31.9	52.9	1.8	(10)
(11)	63	38	60	66	61	4	2.5	61.7	4.6	6.5	23.6	62.6	2.7	(11)
(12)	65	43	69	66	53	3	3.3	61.4	7.4	7.6	31.4	51.5	2.1	(12)
(13)	67	47	71	68	58	2	3.8	62.7	8.7	8.1	29.7	51.3	2.2	(13)
(14)	62	35	67	63	41	1	2.3	60.1	4.8	6.5	34.9	51.9	1.9	(14)
(15)	73	64	72	76	66	10	11.1	66.8	10.6	17.4	22.1	47.4	2.5	(15)
(16)	73	64	71	77	71	6	10.5	68.2	10.0	16.4	21.7	49.1	2.8	(16)
(17)	28	10	27	31	31	4	1.1	28.7	3.0	10.7	8.8	74.4	3.1	(17)
(18)	68	62	76	67	46	1	6.8	67.4	5.1	11.0	27.4	51.3	5.2	(18)
(19)	60	34	67	60	75	5	2.0	57.0	9.7	6.0	33.3	49.1	1.9	(19)
(20)	57	26	58	59	40	15	1.0	53.1	8.2	3.7	30.9	55.6	1.6	(20)
(21)	60	37	61	61	39	3	1.3	55.3	8.7	3.4	34.3	51.6	1.5	(21)
(22)	59	15	57	65	28	8	0.5	55.5	8.4	3.6	27.3	59.3	1.4	(22)
(23)	76	53	74	78	81	2	3.3	74.0	6.7	6.2	29.1	54.2	3.8	(23)
(24)	52	28	58	51	32	3	1.2	47.4	10.2	4.1	32.0	52.1	1.6	(24)
(25)	37	-123	47	34	45	2	-2.8	35.4	5.0	2.3	42.7	48.3	1.7	(25)
(26)	59	27	50	68	52	6	2.3	56.7	6.9	8.4	24.3	57.9	2.5	(26)
(27)	71	42	46	79	63	4	5.2	72.5	3.2	12.4	6.3	73.9	4.2	(27)
(28)	72	58	-97	79	52	7	6.6	71.9	1.8	11.3	2.5	81.5	2.9	(28)
(29)	45	41	140	40	5	6	5.2	40.4	1.3	12.8	1.8	80.7	3.3	(29)
(30)	78	57	40	83	80	11	6.4	80.0	1.8	11.3	2.7	81.5	2.7	(30)
(31)	56	62	47	61	36	26	9.2	51.1	8.2	14.8	38.9	36.2	1.9	(31)
(32)	64	72	60	66	40	1	13.5	61.0	7.7	18.8	30.9	39.4	3.2	(32)
(33)	65	72	49	73	26	12	13.8	60.4	8.2	19.1	25.8	45.5	1.4	(33)
(34)	59	59	40	72	55	17	8.8	55.7	8.2	14.9	30.2	44.4	2.3	(34)
(35)	69	71	45	80	51	12	12.9	65.0	8.1	18.2	21.7	50.0	2.0	(35)
(36)	68	68	49	77	41	12	11.6	63.1	8.0	17.0	23.1	50.1	1.8	(36)
(37)	58	71	47	61	57	12	11.8	55.1	8.4	16.6	34.2	37.3	3.5	(37)

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Soybean hay, over 35% fiber	93.3	5.3	39.7	6.4	7.7	10.9	42.9	30.5	1.3	(1)
(2)	—hay, under 13% protein	91.7	5.6	46.1	7.2	7.7	10.8	36.1	35.6	1.5	(2)
(3)	—hay, 13% protein.....	92.9	8.9	43.2	3.9	7.4	14.1	35.5	33.1	2.3	(3)
(4)	—hay, 15% protein.....	86.2	12.2	52.8	3.3	7.0	16.2	23.2	37.6	2.2	(4)
(5)	—hay meal.....	90.3	14.7	54.2	2.7	6.9	15.6	31.7	31.4	4.7	(5)
(6)	—silage.....	25.2	2.6	13.5	4.1	2.9	4.2	7.0	10.4	0.7	(6)
(7)	—silage, molasses added..	27.0	3.2	17.0	4.2	2.5	4.6	6.4	12.0	1.5	(7)
(8)	—silage, dough stage....	26.1	3.8	15.7	3.1	2.2	5.4	6.3	11.5	0.7	(8)
(9)	—silage, dough stage, molasses added.....	27.0	3.2	16.8	4.3	2.4	4.6	6.6	12.3	1.1	(9)
(10)	—silage, dough stage, sun-wilted.....	34.6	4.8	18.4	2.8	2.6	6.9	8.5	15.8	0.8	(10)
(11)	—silage, sun-wilted, dough stage, molasses added	39.6	5.4	24.6	3.6	3.0	7.8	8.8	19.0	1.0	(11)
(12)	—silage, dough stage, H <sub>2</sub> PO <sub>4</sub> added.....	25.8	3.8	16.7	3.3	2.3	5.0	6.3	11.6	0.6	(12)
(13)	—silage, dough stage, H <sub>2</sub> PO <sub>4</sub> added.....	25.5	2.6	13.9	4.4	2.8	4.0	7.6	10.0	1.1	(13)
(14)	—seed.....	91.1	36.2	80.9	1.2	5.2	40.2	5.2	24.9	15.6	(14)
(15)	—oil meal, hydraulic or expeller process.....	89.7	36.1	77.4	1.1	6.2	42.5	5.6	29.4	6.0	(15)
(16)	—oil meal, solvent process	88.7	41.1	73.0	0.8	5.9	45.6	5.4	30.6	1.2	(16)
(17)	Soybean sorghum mixed silage	25.5	1.2	17.3	13.0	1.2	2.5	7.1	12.2	2.5	(17)
(18)	Starch, corn.....	89.9	0.4	86.0	257.6	0.2	0.4	0.1	89.2	.....	(18)
(19)	Sugar, feeding.....	95.8	-1.4	85.0	.....	4.3	2.4	.....	89.1	.....	(19)
(20)	—wood.....	71.4	.....	53.1	.....	3.9	0.2	.....	67.3	.....	(20)
(21)	Sugarcane bagasse, sifted..	90.3	0	41.0	.....	7.1	1.7	40.7	39.9	0.9	(21)
(22)	Sugarcane, fed green.....	27.3	1.4	16.0	10.6	1.8	2.4	8.9	13.6	0.6	(22)
(23)	—mature, fed green.....	27.9	1.5	16.6	9.9	1.6	2.7	8.7	14.3	0.6	(23)
(24)	—tops, fed green.....	25.2	0.7	14.0	20.4	1.7	1.3	5.6	13.1	0.5	(24)
(25)	—tops, mature, fed green	26.4	0.6	14.9	23.6	1.6	1.3	8.7	14.2	0.6	(25)
(26)	Sunflower fodder, fed green	20.9	1.8	10.2	4.7	3.2	2.5	5.0	9.5	0.7	(26)
(27)	—silage.....	22.0	0.8	10.5	11.5	2.1	2.0	7.6	9.4	0.9	(27)
(28)	—silage.....	24.6	1.2	12.2	9.3	3.2	2.1	8.8	10.0	0.5	(28)
(29)	—silage, early bloom.....	20.9	1.2	12.0	8.8	1.3	2.0	6.8	10.3	0.5	(29)
(30)	—silage, early bloom.....	21.8	1.2	12.5	9.8	1.9	2.1	6.7	10.6	0.5	(30)
(31)	—silage, half bloom.....	20.9	0.8	10.0	12.2	2.3	2.0	6.9	8.8	0.9	(31)
(32)	—silage, half bloom.....	26.0	1.2	12.2	9.4	3.9	2.1	9.9	9.6	0.5	(32)
(33)	—silage, late bloom.....	26.0	0.9	11.2	10.9	3.9	2.1	9.9	9.6	0.5	(33)
(34)	—silage, milk stage.....	21.2	1.0	10.7	9.8	2.1	2.1	6.2	9.5	1.3	(34)
(35)	—silage, mature.....	22.8	0.4	8.7	23.1	2.2	1.6	8.9	9.0	1.1	(35)
(36)	—seed oil meal, with hulls	87.8	17.6	37.2	1.1	5.4	21.2	33.5	26.2	1.5	(36)
(37)	—seed oil meal, hulls removed.....	91.8	34.4	72.	1.1	6.3	38.6	13.6	19.7	13.6	(37)
(38)	Sweetclover, annual yellow, fed green.....	21.6	2.7	13.4	3.9	2.8	3.3	6.4	8.7	0.4	(38)
(39)	Sweetclover silage.....	28.3	4.7	16.7	2.5	2.8	6.1	8.8	9.6	1.0	(39)
(40)	—silage, early bloom.....	27.1	4.6	16.2	2.5	2.7	5.9	8.4	9.1	1.0	(40)
(41)	—silage, full bloom.....	32.7	5.1	18.1	2.6	3.3	7.0	10.4	11.1	0.9	(41)
(42)	Sweetpotato vines, fed green	21.9	1.8	12.3	5.8	2.4	2.8	5.9	10.2	0.6	(42)
(43)	Tanglehead hay, postbloom	92.6	0.8	44.9	54.1	7.6	3.2	37.1	43.8	0.9	(43)
(44)	Tankage.....	89.3	65.5	92.3	0.4	3.8	72.1	.....	1.5	11.9	(44)

## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
( 1 )	47	49	36	58	41	13	5.7	42.5	8.2	11.7	46.0	32.7	1.4	( 1 )	
( 2 )	54	52	45	64	43	16	6.1	50.3	8.4	11.8	39.4	38.8	1.6	( 2 )	
( 3 )	48	63	31	59	60	8	9.6	46.5	8.0	15.2	38.2	35.6	3.0	( 3 )	
( 4 )	66	75	51	71	43	13	14.1	61.3	8.1	18.8	26.9	43.7	2.5	( 4 )	
( 5 )	60	94	55	47	69	2	16.3	60.0	7.6	17.3	35.1	34.8	5.2	( 5 )	
( 6 )	59	63	45	66	51	8	10.5	53.6	11.4	16.7	27.6	41.4	2.9	( 6 )	
( 7 )	65	70	45	71	72	11	12.0	63.1	9.3	17.2	23.7	44.3	5.5	( 7 )	
( 8 )	64	71	48	70	53	12	14.6	60.2	8.6	20.5	24.1	44.1	2.7	( 8 )	
( 9 )	65	68	48	72	66	12	11.7	62.1	8.8	17.2	24.5	45.6	3.9	( 9 )	
(10)	56	70	46	55	56	12	14.0	53.3	7.6	20.0	24.5	45.5	2.4	(10)	
(11)	67	69	48	73	54	12	13.6	62.2	7.7	19.7	22.1	48.1	2.4	(11)	
(12)	69	77	44	79	68	2	14.9	64.9	8.9	19.4	24.4	44.8	2.5	(12)	
(13)	57	65	41	66	64	3	10.2	54.7	10.8	15.7	29.9	39.2	4.4	(13)	
(14)	72	90	-126	68	98	1	39.7	88.8	5.7	44.1	5.7	27.4	17.1	(14)	
(15)	86	85	72	88	84	33	40.3	86.3	6.9	47.4	6.2	32.8	6.7	(15)	
(16)	88	90	57	91	38	3	46.3	82.3	6.6	51.4	6.1	34.6	1.3	(16)	
(17)	60	50	53	58	94	3	4.8	67.9	4.8	9.7	28.0	47.8	9.7	(17)	
(18)	93	0	0	96	0	4	0.4	95.7	0.2	0.4	0.1	99.3	.....	(18)	
(19)	90	-59	..	97	..	2	-1.5	88.7	4.5	2.5	.....	93.0	.....	(19)	
(20)	77	..	..	79	..	2	.....	74.4	5.5	0.3	.....	94.2	.....	(20)	
(21)	49	..	58	41	53	1	0	45.4	7.9	1.9	45.0	44.2	1.0	(21)	
(22)	62	57	61	63	51	12	5.1	58.7	6.7	8.9	32.6	49.7	2.1	(22)	
(23)	62	57	58	66	48	8	5.5	59.6	5.9	9.6	31.2	51.3	2.0	(23)	
(24)	58	49	60	58	52	9	2.6	55.6	6.7	5.3	34.3	51.6	2.1	(24)	
(25)	59	47	60	59	52	8	2.3	56.5	6.0	4.9	32.8	54.1	2.2	(25)	
(26)	56	72	20	71	44	2	8.6	48.9	15.4	11.9	24.0	45.3	3.4	(26)	
(27)	49	42	40	56	68	14	3.8	47.7	9.7	9.1	34.4	42.8	4.0	(27)	
(28)	54	55	43	62	83	4	4.8	49.4	12.9	8.7	35.7	40.5	2.2	(28)	
(29)	59	60	42	70	71	3	5.9	57.5	6.4	9.8	32.7	48.7	2.4	(29)	
(30)	60	55	41	72	78	1	5.3	57.2	8.6	9.6	30.7	48.6	2.5	(30)	
(31)	50	37	45	56	62	4	3.6	47.9	10.8	9.8	33.2	42.1	4.1	(31)	
(32)	52	55	45	58	86	2	4.5	46.9	15.0	8.2	38.2	36.5	2.1	(32)	
(33)	48	44	40	57	72	1	3.6	43.1	15.0	8.2	38.2	36.5	2.1	(33)	
(34)	51	48	37	56	74	3	4.7	50.6	10.0	9.7	29.4	45.0	5.9	(34)	
(35)	38	22	35	40	65	3	1.6	38.1	9.7	7.2	39.1	39.1	4.9	(35)	
(36)	44	33	22	36	86	21	20.0	42.4	6.2	24.1	38.1	29.9	1.7	(36)	
(37)	67	89	16	47	86	18	37.5	78.5	6.9	42.1	14.8	21.4	14.8	(37)	
(38)	70	82	58	76	43	3	12.5	62.0	13.1	15.3	29.4	40.5	1.7	(38)	
(39)	62	77	42	72	62	12	16.8	59.0	9.9	21.6	31.1	33.9	3.5	(39)	
(40)	63	78	42	72	65	10	16.8	59.6	9.9	21.6	30.9	33.9	3.7	(40)	
(41)	60	73	44	67	49	2	15.6	55.4	10.0	21.3	31.9	34.1	2.7	(41)	
(42)	60	65	36	72	75	1	8.3	56.3	10.9	12.8	26.9	46.6	2.8	(42)	
(43)	52	25	65	44	34	2	0.9	48.5	8.2	3.5	40.1	47.2	1.0	(43)	
(44)	91	91	..	..	100	3	73.4	103.4	4.3	80.7	.....	1.7	13.3	(44)	

TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Teff hay, mature.....	89.8	5.0	60.3	11.1	4.3	8.4	27.3	48.2	1.6	(1)
(2)	—hay, overripe.....	90.6	5.3	53.1	9.2	6.5	10.1	29.6	43.4	1.0	(2)
(3)	Timothy hay, all expts....	82.5	2.9	45.4	14.7	3.9	6.3	28.5	41.7	2.1	(3)
(4)	—hay.....	91.9	1.9	51.1	25.6	4.6	5.3	30.9	48.9	2.2	(4)
(5)	—hay, prebloom.....	86.4	5.5	54.1	8.7	6.0	10.3	27.8	40.5	1.8	(5)
(6)	—hay, early bloom.....	78.8	3.9	46.6	10.8	4.9	6.8	26.5	38.4	2.2	(6)
(7)	—hay, half bloom.....	88.0	4.8	52.8	9.9	6.2	9.0	31.2	39.9	1.7	(7)
(8)	—hay, full bloom.....	76.1	3.0	43.2	13.3	4.4	6.2	26.3	37.1	2.1	(8)
(9)	—hay, late bloom.....	87.5	3.8	50.6	12.4	5.7	7.7	28.4	43.4	2.3	(9)
(10)	—hay, postbloom.....	76.4	2.0	37.4	17.9	3.9	4.8	28.2	37.4	2.1	(10)
(11)	—hay, mature.....	73.2	1.8	34.7	18.4	4.0	4.2	26.8	36.3	1.9	(11)
(12)	—hay, overripe.....	80.1	1.8	42.9	23.7	4.4	5.0	24.6	43.9	2.2	(12)
(13)	—hay, dehydrated.....	88.2	4.1	54.1	12.4	5.3	7.9	27.9	44.7	2.4	(13)
(14)	—hay, prebloom, dehydrated.....	86.7	6.1	56.1	8.3	6.1	10.2	25.7	41.9	2.8	(14)
(15)	—hay, early bloom, dehydrated.....	89.0	4.1	58.4	14.3	6.0	8.2	26.6	45.9	2.3	(15)
(16)	—hay, full bloom, dehydrated.....	87.6	4.0	54.8	12.6	5.0	7.6	28.6	44.1	2.3	(16)
(17)	—hay, late bloom, dehydrated.....	88.9	4.3	55.0	12.0	6.0	8.0	28.7	43.7	2.5	(17)
(18)	—hay, postbloom, dehydrated.....	89.2	2.2	49.8	21.0	4.9	5.8	30.9	45.5	2.1	(18)
(19)	—meal.....	89.8	2.5	47.8	17.9	4.4	6.0	28.0	49.1	2.3	(19)
(20)	—fed green.....	27.9	1.4	18.5	12.1	2.0	2.4	8.1	14.5	0.9	(20)
(21)	—silage.....	31.6	1.9	18.8	9.1	2.3	3.3	11.2	13.7	1.1	(21)
(22)	—silage, prebloom.....	26.9	1.9	17.0	7.8	2.1	3.2	9.1	11.6	0.9	(22)
(23)	—silage, early bloom.....	31.8	1.4	1.4	11.5	2.1	2.8	12.5	13.5	0.9	(23)
(24)	—silage, full bloom.....	36.2	2.2	21.5	8.8	2.5	3.8	12.2	16.3	1.4	(24)
(25)	—silage, sun-wilted.....	41.8	2.3	24.7	9.6	2.9	4.6	14.3	18.6	1.4	(25)
(26)	—silage, prebloom, sun-wilted.....	44.0	3.0	28.2	8.2	3.1	5.5	14.3	19.4	1.7	(26)
(27)	—silage, early bloom, sun-wilted.....	36.2	1.6	20.9	12.3	2.6	3.3	13.0	16.2	1.1	(27)
(28)	—silage, full bloom, sun-wilted.....	45.0	2.4	24.9	9.2	3.0	4.9	15.3	20.4	1.4	(28)
(29)	—silage, A. I. V.....	35.0	1.8	19.4	9.7	2.3	3.4	12.4	16.0	0.9	(29)
(30)	—silage, early bloom, A. I. V.....	30.4	1.2	16.4	12.3	2.1	2.5	11.6	13.4	0.8	(30)
(31)	—silage, half bloom, A. I. V.....	39.7	2.5	22.7	8.0	2.5	4.4	12.9	18.9	1.0	(31)
(32)	—silage, molasses added.....	33.4	1.8	19.7	9.8	2.4	3.5	11.1	15.2	1.2	(32)
(33)	—silage, prebloom, molasses added.....	25.3	1.7	15.6	8.1	2.1	3.1	8.2	10.9	1.0	(33)
(34)	—silage, early bloom, molasses added.....	28.3	1.5	15.8	9.5	2.0	2.8	10.5	12.1	0.9	(34)
(35)	—silage, full bloom, molasses added.....	38.5	2.1	22.3	9.5	2.6	3.9	12.9	17.7	1.4	(35)
(36)	—silage, late bloom, molasses added.....	39.8	1.4	23.2	16.0	2.4	3.3	13.0	19.9	1.2	(36)
(37)	—silage, 8-10% molasses added.....	37.3	1.7	22.3	12.2	2.7	3.6	10.9	19.1	1.0	(37)



## AND DIGESTIBILITY WITH CATTLE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract			
( 1 )	70	59	73	69	60	4	5.6	67.2	4.8	9.4	30.4	53.6	1.8	( 1 )		
( 2 )	63	52	72	59	43	7	5.8	58.6	7.2	11.1	32.7	47.9	1.1	( 2 )		
( 3 )	58	46	58	57	46	144	3.5	55.0	4.7	7.6	34.5	50.7	2.5	( 3 )		
( 4 )	57	36	51	62	63	6	2.1	55.6	5.0	5.8	33.6	53.2	2.4	( 4 )		
( 5 )	66	54	75	65	34	9	6.4	62.6	7.0	11.9	32.2	46.8	2.1	( 5 )		
( 6 )	62	58	68	60	33	4	5.0	59.2	6.2	8.6	33.6	48.8	2.8	( 6 )		
( 7 )	63	54	68	62	52	1	5.5	60.0	7.0	10.2	35.5	45.4	1.9	( 7 )		
( 8 )	58	49	62	59	42	16	4.0	56.8	5.8	8.1	34.6	48.8	2.7	( 8 )		
( 9 )	61	49	62	63	36	1	4.3	57.8	6.5	8.8	32.4	49.7	2.6	( 9 )		
(10)	50	41	50	51	47	18	2.6	48.9	5.1	6.3	36.9	49.0	2.7	(10)		
(11)	48	42	51	48	43	9	2.4	47.4	5.5	5.8	36.6	49.5	2.6	(11)		
(12)	56	35	55	59	36	2	2.2	53.6	5.5	6.2	30.7	54.9	2.7	(12)		
(13)	62	51	60	66	54	25	4.6	61.3	6.0	9.0	31.6	50.7	2.7	(13)		
(14)	67	59	68	69	59	9	7.0	64.7	7.0	11.8	29.6	48.4	3.2	(14)		
(15)	69	50	71	72	45	2	4.6	65.6	6.7	9.2	29.9	51.6	2.6	(15)		
(16)	64	53	62	68	58	4	4.6	62.5	5.7	8.7	32.6	50.4	2.6	(16)		
(17)	65	53	64	68	48	1	4.8	61.9	6.7	9.0	32.3	49.2	2.8	(17)		
(18)	57	39	53	62	61	2	2.5	55.8	5.5	6.5	34.6	51.0	2.4	(18)		
(19)	55	42	56	57	31	3	2.8	53.2	4.9	6.7	31.2	54.6	2.6	(19)		
(20)	69	59	68	72	57	15	5.1	66.3	7.1	8.6	29.2	52.0	3.1	(20)		
(21)	61	56	66	59	59	9	5.9	59.5	7.2	10.5	35.6	43.3	2.4	(21)		
(22)	66	60	70	63	67	2	7.2	63.1	7.9	12.0	33.8	42.8	3.5	(22)		
(23)	57	50	64	54	50	3	4.4	55.6	6.7	8.9	39.3	42.3	2.8	(23)		
(24)	61	57	63	60	60	3	6.0	59.4	6.9	10.6	33.8	44.9	3.8	(24)		
(25)	61	51	64	61	58	16	5.6	59.0	6.9	10.9	34.2	44.7	3.3	(25)		
(26)	66	55	71	66	58	6	6.9	64.1	7.0	12.6	32.6	44.0	3.8	(26)		
(27)	60	47	66	58	53	5	4.3	57.6	7.2	9.2	35.8	44.7	3.1	(27)		
(28)	56	50	54	60	62	5	5.4	55.4	6.6	10.8	34.0	45.5	3.1	(28)		
(29)	57	53	60	56	60	5	5.2	55.5	6.7	9.8	35.4	45.4	2.7	(29)		
(30)	56	49	61	53	57	3	4.1	54.1	7.0	8.3	38.2	43.7	2.8	(30)		
(31)	59	57	59	59	64	2	6.4	57.2	6.4	11.2	32.5	47.3	2.6	(31)		
(32)	61	52	65	60	58	36	5.4	59.0	7.2	10.5	33.3	45.5	3.5	(32)		
(33)	64	55	72	62	58	21	6.8	61.8	8.3	12.3	32.4	43.2	3.8	(33)		
(34)	58	53	63	54	59	3	5.3	55.8	7.1	10.0	37.1	42.7	3.1	(34)		
(35)	59	54	62	58	59	18	5.5	58.0	6.8	10.2	33.4	46.0	3.6	(35)		
(36)	59	42	61	62	58	9	3.4	58.4	6.1	8.2	32.8	49.8	3.1	(36)		
(37)	62	47	61	66	59	6	4.5	59.7	7.3	9.6	29.3	51.1	2.7	(37)		



TABLE 1—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Timothy silage, early bloom, 8% molasses added..	32.1	1.6	20.8	11.7	2.7	3.3	9.5	15.6	1.0	( 1 )
( 2 )	—silage, full bloom, 10% molasses added.....	40.0	1.7	22.8	12.5	2.7	3.7	11.7	20.9	1.0	( 2 )
( 3 )	—silage, sun-wilted, molasses added.....	44.4	2.4	27.0	10.0	3.1	4.7	14.6	20.5	1.5	( 3 )
( 4 )	—silage, prebloom, sun-wilted, molasses added	44.7	3.2	29.0	8.0	3.4	5.7	13.6	20.3	1.7	( 4 )
( 5 )	—silage, early bloom, sun-wilted, molasses added	39.6	1.8	22.3	11.5	2.3	3.7	14.4	18.1	1.1	( 5 )
( 6 )	—silage, half bloom, sun-wilted, molasses added	26.4	1.7	16.7	8.6	2.3	2.9	9.0	11.2	1.0	( 6 )
( 7 )	—silage, full bloom, sun-wilted, molasses added	46.5	2.3	27.1	10.8	3.1	4.5	15.7	21.7	1.5	( 7 )
( 8 )	—silage, late bloom, sun-wilted, molasses added	46.6	1.8	28.0	14.6	3.1	3.9	15.5	22.6	1.5	( 8 )
( 9 )	—silage, H <sub>3</sub> PO <sub>4</sub> added..	36.3	1.3	19.9	14.0	2.5	3.0	13.1	16.7	1.0	( 9 )
(10)	—silage, early bloom, H <sub>3</sub> PO <sub>4</sub> added.....	31.3	1.1	17.2	14.4	2.2	2.4	12.3	13.6	0.8	(10)
(11)	—silage, full bloom, H <sub>3</sub> PO <sub>4</sub> added.....	34.9	1.1	19.0	15.8	2.1	2.8	12.7	16.2	1.1	(11)
(12)	—silage, late bloom, H <sub>3</sub> PO <sub>4</sub> added.....	43.1	1.7	25.7	14.5	3.0	3.6	14.4	20.7	1.4	(12)
(13)	—silage, post bloom, H <sub>3</sub> PO <sub>4</sub> added.....	36.0	1.4	18.5	12.1	2.7	3.2	12.7	16.4	1.0	(13)
(14)	Timothy grass mixed silage, half bloom, molasses added.....	29.4	2.0	18.1	8.2	2.5	3.6	9.8	12.5	1.0	(14)
(15)	Timothy grass weeds mixed hay.....	85.7	2.8	49.0	16.5	5.0	6.3	27.4	44.8	2.2	(15)
(16)	—mixed hay, half bloom	86.6	4.3	51.8	11.0	5.7	8.3	28.8	42.1	1.7	(16)
(17)	—mixed hay, full bloom..	84.6	1.4	41.9	29.5	5.1	5.1	30.9	41.9	1.6	(17)
(18)	—mixed hay, 2d cutting, full bloom.....	85.7	5.9	52.2	7.8	7.2	10.5	26.0	39.7	2.3	(18)
(19)	Tobosa vine-mesquite mixed hay, mature.....	86.0	2.2	32.3	13.3	10.3	5.7	29.8	39.2	1.0	(19)
(20)	Velvetbean hay, postbloom.	92.7	5.5	69.8	11.7	3.2	8.0	40.1	39.8	1.6	(20)
(21)	—vines, fed green.....	24.0	2.6	14.8	4.8	2.8	3.7	6.5	10.5	0.5	(21)
(22)	—vines, dough stage, fed green.....	24.0	2.5	15.3	5.0	3.6	3.6	4.6	11.7	0.5	(22)
(23)	—seed.....	89.4	13.1	76.9	4.8	4.2	17.3	14.4	48.9	4.6	(23)
(24)	Vetch hay, common.....	81.6	8.2	51.2	5.3	6.9	12.4	23.1	37.1	2.1	(24)
(25)	—hay, overripe.....	81.8	8.8	52.8	5.0	7.0	12.7	21.6	37.9	2.6	(25)
(26)	—silage.....	30.1	2.0	13.9	8.7	2.4	3.5	9.8	13.4	1.0	(26)
(27)	—silage, steamed.....	30.5	0.6	15.3	26.0	2.3	3.8	10.1	13.5	0.8	(27)
(28)	Wheat straw.....	92.6	0.5	43.1	86.7	10.3	3.5	38.2	39.5	1.1	(28)
(29)	—bran.....	88.4	12.7	62.9	4.0	5.4	16.3	10.0	51.7	5.0	(29)
(30)	—bran, all expts.....	85.9	10.7	60.6	4.7	5.7	14.0	9.2	52.8	4.2	(30)
(31)	—bran, spring.....	92.6	12.3	64.9	4.3	6.6	16.7	11.2	53.1	5.0	(31)
(32)	—mixed feed, winter.....	90.7	12.4	67.2	4.4	6.1	16.1	13.3	50.0	5.2	(32)
(33)	Yeast, dried.....	91.7	50.2	75.1	0.5	7.8	54.6	.....	29.2	0.6	(33)
(34)	—wood sugar.....	90.7	43.1	75.3	0.7	7.2	47.3	.....	34.2	2.0	(34)

## AND DIGESTIBILITY WITH CATTLE—(Concluded)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%	%	%	%	%	%		
( 1 )	68	49	73	70	57	2	5.1	64.8	8.3	10.4	29.6	48.5	3.2	( 1 )	
( 2 )	59	46	55	64	59	2	4.2	57.1	6.8	9.2	29.2	52.2	2.5	( 2 )	
( 3 )	63	52	66	63	59	57	5.5	60.8	7.0	10.6	32.9	46.1	3.4	( 3 )	
( 4 )	67	56	72	68	58	15	7.2	64.9	7.6	12.8	30.5	45.3	3.8	( 4 )	
( 5 )	59	48	62	56	58	3	4.5	56.3	5.8	9.4	36.4	45.5	2.9	( 5 )	
( 6 )	66	60	70	64	68	2	6.6	63.3	8.8	11.0	34.0	42.4	3.8	( 6 )	
( 7 )	60	51	62	60	60	22	5.0	58.2	6.7	9.7	33.8	46.6	3.2	( 7 )	
( 8 )	62	46	66	63	53	4	3.9	60.2	6.6	8.4	33.2	48.6	3.2	( 8 )	
( 9 )	57	44	59	57	60	9	3.6	54.9	7.0	8.3	36.1	45.7	2.9	( 9 )	
(10)	58	46	63	54	59	3	3.6	55.1	7.1	7.8	39.4	43.1	2.6	(10)	
(11)	56	40	56	57	64	2	3.2	54.5	6.1	8.1	36.5	46.2	3.1	(11)	
(12)	62	46	64	64	52	2	3.9	59.7	7.0	8.4	33.3	48.1	3.2	(12)	
(13)	53	44	54	54	64	2	3.9	51.4	7.6	8.9	35.3	45.5	2.7	(13)	
(14)	64	55	68	64	65	4	6.7	61.6	8.4	12.1	33.4	42.8	3.3	(14)	
(15)	59	44	57	63	48	14	3.3	57.2	5.8	7.4	32.0	52.2	2.6	(15)	
(16)	62	52	61	66	56	4	5.0	59.8	6.6	9.6	33.2	48.6	2.0	(16)	
(17)	51	27	53	53	50	1	1.6	49.4	6.0	6.0	36.5	49.6	1.9	(17)	
(18)	64	56	65	67	54	1	6.9	60.9	8.4	12.3	30.3	46.3	2.7	(18)	
(19)	42	40	44	42	23	18	2.6	37.6	12.0	6.6	34.6	45.6	1.2	(19)	
(20)	76	69	78	76	79	2	5.9	75.3	3.5	8.6	43.3	42.9	1.7	(20)	
(21)	69	69	58	74	63	14	10.7	61.8	11.6	15.5	26.9	43.9	2.1	(21)	
(22)	73	70	59	80	64	4	10.6	63.9	14.9	15.1	19.3	48.6	2.1	(22)	
(23)	85	76	79	91	76	3	14.7	86.0	4.7	19.4	16.1	54.7	5.1	(23)	
(24)	66	66	58	71	70	4	10.0	62.8	8.4	15.2	28.3	45.5	2.6	(24)	
(25)	67	70	58	72	71	2	10.8	64.6	8.6	15.5	26.4	46.3	3.2	(25)	
(26)	65	56	63	67	77	4	6.5	62.9	7.9	11.6	32.7	44.3	3.5	(26)	
(27)	52	15	51	63	63	4	1.9	50.3	7.6	12.4	33.2	44.2	2.6	(27)	
(28)	53	14	58	49	42	30	0.5	46.5	11.1	3.8	41.3	42.6	1.2	(28)	
(29)	71	78	44	75	62	6	14.4	71.1	6.1	18.4	11.3	58.5	5.7	(29)	
(30)	70	76	30	76	74	63	12.4	70.5	6.6	16.3	10.7	61.5	4.9	(30)	
(31)	71	74	26	77	78	2	13.3	70.1	7.1	18.0	12.1	57.4	5.4	(31)	
(32)	73	77	50	76	87	2	13.7	74.1	6.7	17.8	14.7	55.1	5.7	(32)	
(33)	89	92	0	89	-89	2	54.7	81.9	8.0	59.5	.....	31.9	0.6	(33)	
(34)	88	91	0	89	40	2	47.5	83.0	7.9	52.2	.....	37.7	2.2	(34)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Acacia pods, mature, dry..	91.5	6.1	59.7	8.7	5.1	11.8	13.9	58.4	2.3	(1)
(2)	—pods, dry.....	91.4	5.7	58.1	9.3	5.1	11.5	17.2	55.6	2.0	(2)
(3)	Acorns, live and post oak, whole.....	92.3	-2.6	-15.4	.....	2.3	4.9	12.0	66.0	7.1	(3)
(4)	Alfalfa hay, all expts.....	89.0	10.8	49.3	3.6	8.1	15.0	28.9	35.0	2.0	(4)
(5)	—hay, all expts. (Goats)	82.2	10.4	43.7	3.2	8.7	14.1	26.1	31.8	1.5	(5)
(6)	—hay.....	93.6	12.0	59.0	3.9	8.0	16.4	22.8	43.6	2.8	(6)
(7)	—hay, 1st cutting, very immature.....	89.4	15.7	53.4	2.4	11.3	21.8	17.7	35.7	2.9	(7)
(8)	—hay, prebloom (Goats).....	77.4	8.9	40.2	3.5	9.4	12.0	24.6	30.3	1.1	(8)
(9)	—hay, early bloom.....	(88.8)	13.0	52.5	3.0	7.5	16.6	25.9	36.9	1.9	(9)
(10)	—hay, early bloom (Goats).....	79.2	10.2	43.6	3.3	8.2	13.2	26.7	29.7	1.4	(10)
(11)	—hay, half bloom.....	(87.6)	12.7	49.5	2.9	7.1	16.5	25.9	36.3	1.8	(11)
(12)	—hay, full bloom.....	(84.2)	10.4	45.2	3.3	7.0	13.9	25.8	35.7	1.8	(12)
(13)	—hay, full bloom (Goats).....	79.3	9.4	42.0	3.5	8.5	12.4	28.2	28.9	1.3	(13)
(14)	—hay, postbloom.....	89.1	10.2	44.1	3.3	7.1	14.3	34.4	31.6	1.7	(14)
(15)	—hay, overripe.....	93.6	8.8	54.2	5.2	7.8	12.4	36.9	35.0	1.5	(15)
(16)	—hay, dehydrated.....	89.8	12.1	49.0	3.0	10.7	16.8	30.5	30.1	1.7	(16)
(17)	—hay, dehydrated (Goats).....	84.4	12.1	48.8	3.0	8.3	16.1	25.1	32.7	2.2	(17)
(18)	—hay, prebloom, dehydrated.....	91.1	11.2	47.9	3.3	12.4	16.2	29.9	30.9	1.7	(18)
(19)	—hay, early bloom, dehydrated.....	(88.5)	11.2	50.8	3.5	9.9	15.8	23.8	36.7	2.3	(19)
(20)	—hay, brown.....	89.8	10.0	54.5	4.5	9.3	14.6	24.7	39.8	1.4	(20)
(21)	—hay, U. S. grade No. 2 green, 2d cutting.....	87.4	12.0	46.7	2.9	7.5	15.6	27.4	35.2	1.7	(21)
(22)	—hay, dried on riders....	86.4	13.4	47.8	2.6	7.4	16.9	32.3	27.8	2.0	(22)
(23)	—hay, leafy.....	90.0	13.5	52.8	2.9	8.7	17.7	25.2	36.8	1.6	(23)
(24)	—hay, stemmy.....	91.6	11.3	52.0	3.6	6.7	15.5	29.2	38.4	1.8	(24)
(25)	—hay, 1st cutting.....	88.1	10.0	47.3	3.7	8.1	14.1	31.8	32.4	1.7	(25)
(26)	—hay, 1st cutting, prebloom.....	79.4	13.1	45.0	2.4	9.8	16.8	24.5	26.7	1.6	(26)
(27)	—hay, 1st cutting, early bloom.....	90.2	9.7	47.0	3.9	7.8	13.8	34.0	33.3	1.3	(27)
(28)	—hay, 1st cutting, half bloom.....	87.4	8.4	44.4	4.3	7.0	12.6	34.3	31.9	1.6	(28)
(29)	—hay, 1st cutting, full bloom.....	83.9	10.2	43.4	3.2	8.5	14.3	27.8	31.3	2.0	(29)
(30)	—hay, 2d cutting.....	88.8	11.4	50.4	3.4	8.1	15.1	29.7	34.0	1.9	(30)
(31)	—hay, 2d cutting, prebloom.....	84.1	11.4	49.1	3.3	7.2	15.2	27.1	32.0	2.6	(31)
(32)	—hay, 2d cutting, early bloom.....	89.2	9.5	47.5	5.0	7.0	13.4	33.9	33.8	1.1	(32)
(33)	—hay, 2d cutting, half bloom.....	92.1	8.9	47.3	4.3	7.6	12.6	34.8	35.5	1.3	(33)
(34)	—hay, 2d cutting, full bloom.....	87.4	10.7	44.5	3.2	8.6	15.6	30.9	31.2	1.1	(34)
(35)	—hay, 3d or later cutting.....	85.7	11.1	48.8	3.4	7.5	15.4	25.9	34.8	2.1	(35)
(36)	—hay, 3d cutting, prebloom.....	85.5	12.5	49.9	3.0	6.1	16.9	27.4	33.0	2.1	(36)
(37)	—hay, 3d or later cutting, early bloom.....	85.2	14.2	48.7	2.4	10.1	18.2	22.2	32.1	2.6	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	66	52	21	79	88	2	6.7	65.2	5.6	12.9	15.2	63.8	2.5	( 1 )	
( 2 )	65	49	32	78	81	4	6.2	63.6	5.6	12.6	18.8	60.8	2.2	( 2 )	
( 3 )	56	-53	-2	51	-289	2	-2.8	-16.7	2.5	5.3	13.0	71.5	7.7	( 3 )	
( 4 )	61	72	45	69	31	337	12.1	55.4	9.1	16.8	32.5	39.4	2.2	( 4 )	
( 5 )	59	74	41	69	19	15	12.6	53.2	10.6	17.1	31.7	38.8	1.8	( 5 )	
( 6 )	67	73	43	78	52	3	12.8	63.0	8.6	17.5	24.4	46.5	3.0	( 6 )	
( 7 )	69	72	65	65	46	2	17.6	59.7	12.6	24.4	19.8	40.0	3.2	( 7 )	
( 8 )	59	74	43	69	-8	4	11.5	51.9	12.2	15.5	31.8	39.1	1.4	( 8 )	
( 9 )	64	78	48	72	10	6	14.6	59.1	8.4	18.7	29.1	41.7	2.1	( 9 )	
(10)	61	77	43	71	28	6	12.9	55.0	10.4	16.7	33.7	37.4	1.8	(10)	
(11)	62	77	41	71	10	3	14.5	56.5	8.1	18.8	29.6	41.5	2.0	(11)	
(12)	58	75	38	66	35	3	12.4	53.7	8.3	16.5	30.7	42.4	2.1	(12)	
(13)	59	76	42	69	27	2	11.9	53.0	10.7	15.6	35.6	36.5	1.6	(13)	
(14)	54	72	42	58	28	4	11.5	49.5	8.0	16.0	38.6	35.5	1.9	(14)	
(15)	62	71	53	71	28	2	9.4	57.9	8.3	13.2	39.4	37.5	1.6	(15)	
(16)	61	72	46	70	48	11	13.5	54.6	11.9	18.7	34.0	33.5	1.9	(16)	
(17)	62	75	45	71	44	2	14.3	57.3	9.7	19.1	29.7	38.9	2.6	(17)	
(18)	60	69	45	69	50	11	12.3	52.6	13.6	17.8	32.8	33.9	1.9	(18)	
(19)	64	71	46	74	28	2	12.6	57.4	11.2	17.8	26.9	41.5	2.6	(19)	
(20)	68	68	68	71	-12	5	11.1	60.7	10.4	16.3	27.5	44.2	1.6	(20)	
(21)	58	77	39	66	20	6	13.7	53.4	8.6	17.8	31.3	40.3	2.0	(21)	
(22)	59	79	44	64	54	6	15.5	55.3	8.6	19.6	37.4	32.1	2.3	(22)	
(23)	64	76	48	72	22	9	15.0	58.7	9.7	19.7	28.0	40.8	1.8	(23)	
(24)	60	73	45	68	35	2	12.3	56.8	7.3	16.9	31.9	41.9	2.0	(24)	
(25)	59	71	45	69	17	43	11.4	53.7	9.2	16.0	36.1	36.8	1.9	(25)	
(26)	65	78	51	70	20	4	16.5	56.7	12.3	21.2	30.8	33.7	2.0	(26)	
(27)	58	70	47	65	-14	8	10.7	52.0	8.6	15.3	37.7	37.0	1.4	(27)	
(28)	55	67	40	68	16	18	9.6	50.8	8.0	14.4	39.3	36.5	1.8	(28)	
(29)	57	72	41	65	29	8	12.2	51.7	10.1	17.0	33.1	37.4	2.4	(29)	
(30)	62	75	45	71	36	49	12.8	56.8	9.1	17.0	33.4	38.4	2.1	(30)	
(31)	62	75	44	71	53	12	13.6	58.4	8.6	18.1	32.2	38.0	3.1	(31)	
(32)	58	71	46	66	..	8	10.6	53.2	7.8	15.0	38.0	38.0	1.2	(32)	
(33)	56	69	44	64	14	5	9.7	51.4	8.2	14.0	37.8	38.6	1.4	(33)	
(34)	57	68	46	63	-1	10	12.2	50.9	9.8	17.9	35.4	35.6	1.3	(34)	
(35)	62	72	44	72	26	36	13.0	56.9	8.7	18.0	30.2	40.6	2.5	(35)	
(36)	62	74	47	70	31	4	14.6	58.4	7.1	19.8	32.0	38.7	2.4	(36)	
(37)	64	78	42	73	30	10	16.7	57.2	11.8	21.4	26.1	37.7	3.0	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1)	Alfalfa hay, 3d cutting, half bloom.....	83.1	10.1	48.9	3.8	7.2	14.1	23.2	36.3	2.3	( 1)
( 2)	—hay, 3d cutting, full bloom.....	92.0	4.0	41.6	9.4	8.1	8.9	38.2	36.1	0.7	( 2)
( 3)	—hay, low ash.....	88.1	10.0	48.4	3.8	6.2	14.2	29.7	35.9	2.1	( 3)
( 4)	—hay, high ash.....	89.0	12.3	50.0	3.1	9.9	16.6	26.7	33.8	2.0	( 4)
( 5)	—hay, under 25% fiber..	86.0	12.1	50.0	3.1	8.4	16.4	21.5	37.3	2.4	( 5)
( 6)	—hay, 25-28% fiber.....	88.3	12.3	51.0	3.2	7.9	16.3	26.0	36.2	1.9	( 6)
( 7)	—hay, 28-31% fiber.....	90.0	10.9	50.6	3.6	8.6	14.9	29.5	35.2	1.8	( 7)
( 8)	—hay, 31-34% fiber.....	90.4	10.1	49.7	3.9	7.6	14.1	33.1	33.7	1.9	( 8)
( 9)	—hay, over 34% fiber....	90.1	8.5	46.0	4.4	7.6	12.7	35.9	32.4	1.5	( 9)
(10)	—hay, under 13% protein	91.6	8.0	48.7	5.1	7.7	12.1	34.4	35.8	1.6	(10)
(11)	—hay, under 13% protein (Goats).....	78.0	9.0	40.8	3.6	9.1	12.1	25.8	29.9	1.1	(11)
(12)	—hay, 13% protein.....	90.4	10.0	48.3	3.8	7.6	14.7	31.1	35.2	1.8	(12)
(13)	—hay, 13% protein (Goats).....	83.9	10.8	45.5	3.2	8.4	14.6	26.4	32.7	1.8	(13)
(14)	—hay, 15% protein.....	88.8	11.2	50.8	3.5	8.3	15.4	27.1	36.0	2.0	(14)
(15)	—hay, 17% protein.....	85.7	13.5	50.1	2.7	8.2	17.5	24.8	33.0	2.2	(15)
(16)	—hay, 17% protein (Goats).....	88.8	13.7	48.8	2.6	8.0	18.5	25.3	35.1	1.9	(16)
(17)	—hay, 20% protein.....	86.2	16.5	52.2	2.2	11.3	21.4	19.3	31.4	2.8	(17)
(18)	—meal.....	89.4	10.9	51.9	3.7	8.3	15.2	26.7	37.3	1.9	(18)
(19)	—meal, dehydrated.....	89.6	10.6	47.1	3.5	10.7	15.3	26.9	34.7	2.0	(19)
(20)	—meal, dehydrated (Goats).....	90.3	10.2	44.7	3.4	8.8	15.2	27.1	37.5	1.7	(20)
(21)	—meal, poor quality.....	86.5	11.7	46.9	3.0	5.9	16.0	33.6	28.4	2.6	(21)
(22)	—meal, 1st cutting, very immature.....	89.4	15.7	53.4	2.4	11.3	21.8	17.7	35.7	2.9	(22)
(23)	—meal, prebloom, dehydrated.....	92.6	10.7	47.5	3.4	13.4	15.6	29.8	31.8	2.0	(23)
(24)	—meal, full bloom.....	(87.0)	11.0	49.9	3.5	9.7	15.5	23.4	36.1	2.3	(24)
(25)	—leaf meal.....	86.2	15.4	52.9	2.4	10.5	20.3	15.2	38.4	1.8	(25)
(26)	—leaves, 2d cutting, half bloom, dried.....	87.5	15.6	57.5	2.7	9.5	19.4	15.1	40.5	3.0	(26)
(27)	—leaves, 3d cutting, half bloom, dried:.....	85.0	14.2	55.8	2.9	8.7	18.2	15.0	39.9	3.2	(27)
(28)	—leaves and blossoms, 1st cutting, half bloom, dried.....	86.6	13.2	53.0	3.0	8.9	17.6	17.3	40.4	2.4	(28)
(29)	—stems, 1st cutting, half bloom, dried.....	88.2	4.3	39.2	8.1	4.8	8.5	41.4	32.4	1.1	(29)
(30)	—stems, 2d cutting, half bloom, dried.....	87.3	4.1	41.5	9.1	5.6	8.0	41.6	30.5	1.6	(30)
(31)	—stems, 3d cutting, half bloom, dried.....	86.3	3.8	40.4	9.6	5.4	7.3	38.1	34.3	1.2	(31)
(32)	—fed green, all expts....	23.3	3.4	13.5	3.0	2.2	4.5	6.6	9.3	0.7	(32)
(33)	—very immature, fed green.....	14.6	3.1	9.9	2.2	1.8	3.7	3.2	5.5	0.4	(33)
(34)	—prebloom, fed green....	21.1	3.4	12.8	2.8	2.0	4.3	5.5	8.8	0.5	(34)
(35)	—early bloom, fed green..	23.4	3.5	14.4	3.1	2.6	4.4	6.7	9.0	0.7	(35)
(36)	—half bloom, fed green..	19.9	3.0	11.8	2.9	1.8	4.1	5.4	7.8	0.8	(36)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
							%	%						%	
( 1 )	63	72	43	76	24	12	12.2	58.9	8.7	17.0	27.9	43.6	2.8	( 1 )	
( 2 )	46	45	38	64	0	5	4.4	45.2	8.8	9.7	41.5	39.2	0.8	( 2 )	
( 3 )	59	71	43	67	32	46	11.4	55.0	7.0	16.1	33.7	40.8	2.4	( 3 )	
( 4 )	63	74	48	70	23	75	13.8	56.2	11.1	18.6	30.0	33.1	2.2	( 4 )	
( 5 )	64	74	44	72	29	52	14.1	53.1	9.8	19.1	25.0	43.3	2.8	( 5 )	
( 6 )	63	75	44	72	31	56	13.9	57.8	9.0	18.5	29.4	40.9	2.2	( 6 )	
( 7 )	61	73	46	70	36	70	12.1	56.2	9.5	16.6	32.8	39.1	2.0	( 7 )	
( 8 )	59	72	45	68	40	43	11.2	55.0	8.4	15.6	36.6	37.3	2.1	( 8 )	
( 9 )	56	67	45	64	16	50	9.4	51.0	8.4	14.1	39.8	36.0	1.7	( 9 )	
(10)	58	66	46	67	25	53	8.7	53.2	8.4	13.2	37.6	39.1	1.7	(10)	
(11)	59	74	43	69	4	6	11.5	52.3	11.7	15.5	33.1	38.3	1.4	(11)	
(12)	58	71	42	68	24	65	11.1	53.4	8.4	15.6	35.1	38.9	2.0	(12)	
(13)	60	74	40	70	31	7	12.9	54.2	10.0	17.4	31.5	39.0	2.1	(13)	
(14)	62	73	46	71	34	93	12.6	57.2	9.4	17.3	30.5	40.6	2.2	(14)	
(15)	64	77	46	71	36	55	15.7	58.5	9.6	20.4	28.9	38.5	2.6	(15)	
(16)	60	74	41	68	22	2	15.4	55.0	9.0	20.8	28.5	39.6	2.1	(16)	
(17)	68	77	52	73	43	5	19.1	60.5	13.1	24.8	22.4	36.4	3.3	(17)	
(18)	63	72	47	72	36	15	12.2	53.0	9.3	17.0	29.9	41.7	2.1	(18)	
(19)	59	69	43	68	31	8	11.8	52.6	11.9	17.1	30.0	38.8	2.2	(19)	
(20)	54	67	33	66	22	2	11.3	49.5	9.7	16.8	30.0	41.6	1.9	(20)	
(21)	56	73	45	60	52	2	13.5	54.2	6.8	18.5	38.8	32.9	3.0	(21)	
(22)	69	72	65	65	46	2	17.6	59.7	12.6	24.4	19.8	40.0	3.2	(22)	
(23)	58	69	46	65	53	3	11.6	51.3	14.5	16.8	32.2	34.3	2.2	(23)	
(24)	64	71	46	74	28	2	12.6	57.4	11.2	17.8	26.9	41.5	2.6	(24)	
(25)	70	76	50	78	0	2	17.9	61.4	12.2	23.5	17.6	44.6	2.1	(25)	
(26)	72	80	53	78	36	6	17.8	65.7	10.9	22.2	17.3	46.2	3.4	(26)	
(27)	72	78	53	78	24	6	16.7	65.6	10.2	21.4	17.6	47.0	3.8	(27)	
(28)	67	75	56	72	20	6	15.2	61.2	10.3	20.3	20.0	46.6	2.8	(28)	
(29)	46	51	37	56	58	6	4.9	44.5	5.4	9.6	46.9	36.9	1.2	(29)	
(30)	49	51	41	60	56	6	4.7	47.5	6.4	9.2	47.6	35.0	1.8	(30)	
(31)	49	52	39	61	29	6	4.4	46.8	6.2	8.5	44.2	39.7	1.4	(31)	
(32)	63	75	44	72	35	55	14.5	58.0	9.5	19.3	28.5	39.5	3.2	(32)	
(33)	76	84	64	80	38	2	21.2	67.9	12.1	25.3	22.1	38.1	2.4	(33)	
(34)	66	78	48	75	23	4	16.0	60.9	9.6	20.5	26.0	41.7	2.2	(34)	
(35)	68	79	49	78	38	4	15.0	61.5	11.0	19.0	28.8	38.2	3.0	(35)	
(36)	64	74	46	73	36	1	15.1	59.5	9.1	20.4	27.3	39.3	3.9	(36)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Alfalfa, full bloom, fed green	22.4	3.1	12.3	3.0	2.5	4.1	6.5	8.8	0.5	(1)
(2)	—1st cutting, fed green...	21.3	2.5	11.6	3.6	1.8	3.5	7.0	8.3	0.7	(2)
(3)	—1st cutting, prebloom, fed green.....	16.9	2.5	9.5	2.8	1.6	3.5	5.1	6.0	0.7	(3)
(4)	—1st cutting, early bloom, fed green.....	23.3	2.7	12.9	3.8	1.9	3.7	7.4	9.5	0.8	(4)
(5)	—1st cutting, full bloom, fed green.....	22.2	2.1	11.4	4.5	1.6	3.0	8.2	8.7	0.7	(5)
(6)	—2d cutting, fed green..	24.9	3.4	14.3	3.3	2.1	4.5	7.3	10.2	0.8	(6)
(7)	—2d cutting, prebloom, fed green.....	23.1	3.6	14.0	2.9	2.0	4.7	5.8	9.8	0.8	(7)
(8)	—2d cutting, early bloom, fed green.....	25.4	3.5	14.5	3.2	2.1	4.5	7.6	10.4	0.8	(8)
(9)	—2d cutting, full bloom, fed green.....	26.7	2.7	14.5	4.4	2.0	3.9	9.2	10.8	0.8	(9)
(10)	—2d cutting, late bloom, fed green.....	28.8	2.7	14.2	4.3	1.8	4.0	11.7	10.7	0.6	(10)
(11)	—3d cutting, prebloom, fed green.....	23.2	4.2	13.2	2.1	2.5	5.7	5.1	9.3	0.6	(11)
(12)	—silage.....	43.7	5.5	23.4	3.2	4.8	8.6	11.0	17.8	1.5	(12)
(13)	—silage, prebloom.....	49.5	6.6	29.9	3.5	5.1	8.9	15.7	18.2	1.6	(13)
(14)	—silage, high ash.....	15.7	2.2	7.3	2.4	5.0	3.0	4.0	3.3	0.4	(14)
(15)	—silage, shredded.....	19.4	2.8	10.0	2.7	2.1	3.7	7.3	5.7	0.6	(15)
(16)	—silage, organic acids or bacteria added.....	19.0	2.6	9.9	2.8	2.5	3.4	6.9	5.5	0.7	(16)
(17)	—silage, prebloom, $PCl_5$ added.....	38.2	5.2	22.5	3.3	3.9	7.1	11.7	14.3	1.2	(17)
(18)	—silage, $PCl_5$ added.....	19.6	3.3	11.6	2.6	2.2	4.1	7.0	5.7	0.6	(18)
(19)	—silage, sugar added.....	17.1	2.4	8.3	2.4	2.0	3.3	6.1	5.3	0.4	(19)
(20)	—silage, $H_2SO_4$ added.....	24.0	3.1	12.8	3.1	2.8	4.6	7.4	8.2	1.0	(20)
(21)	—silage, 2d cutting.....	25.4	2.0	13.1	5.6	2.9	3.6	10.9	5.5	2.5	(21)
(22)	Alfalfa apple mixed silage..	22.3	1.2	12.7	9.8	1.7	2.3	7.2	10.4	0.7	(22)
(23)	Alfalfa grass mixed hay, prebloom.....	86.5	7.4	49.9	5.7	7.4	11.4	31.5	33.8	2.4	(23)
(24)	—mixed fodder, prebloom, fed green.....	(22.0)	2.1	13.7	5.4	1.9	2.9	7.3	9.2	0.7	(24)
(25)	—mixed silage, prebloom	(31.1)	2.1	17.0	7.3	3.4	3.9	11.5	11.3	1.0	(25)
(26)	Alfalfa orchardgrass mixed hay.....	81.7	12.2	50.7	3.2	8.7	15.8	15.5	36.9	4.8	(26)
(27)	Alfalfa steamed potato mixed silage.....	19.2	2.5	10.1	3.1	2.4	3.2	6.7	6.2	0.7	(27)
(28)	Apple pomace, dried, all expts	92.6	-0.5	54.4	.....	6.7	5.6	19.3	56.7	4.3	(28)
(29)	—pomace, wet.....	19.2	-0.3	14.0	.....	0.6	1.0	3.1	13.4	1.1	(29)
(30)	Artichoke silage.....	30.2	0.3	15.7	46.8	5.6	2.1	8.2	13.8	0.5	(30)
(31)	Asparagus berries, dried	88.3	8.5	74.3	7.8	5.9	13.0	13.3	47.2	8.9	(31)
(32)	—buds meal.....	91.0	8.8	42.8	3.9	14.6	14.2	29.0	32.3	0.9	(32)
(33)	Avocado oil meal.....	91.4	8.2	52.3	5.4	18.1	18.6	17.6	36.0	1.1	(33)
(34)	Babassu oil meal.....	92.2	20.6	78.7	2.8	5.1	23.9	12.4	43.4	7.4	(34)
(35)	—oil meal, low fat, high fiber.....	89.8	18.6	62.2	2.4	6.0	24.4	18.0	40.6	0.8	(35)
(36)	Balsamroot fodder, arrowleaf, dry.....	92.9	11.9	62.5	4.3	11.8	15.4	24.2	35.7	5.8	(36)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	61	75	40	73	15	4	13.8	54.8	11.1	18.4	29.1	39.2	2.2	( 1 )	
( 2 )	57	72	39	67	50	11	11.8	54.6	8.3	16.4	32.7	39.2	3.4	( 2 )	
( 3 )	60	71	43	69	44	3	14.6	56.1	9.7	20.5	30.0	35.9	3.9	( 3 )	
( 4 )	58	73	39	68	47	5	11.5	55.2	8.2	15.7	31.9	40.9	3.3	( 4 )	
( 5 )	53	69	35	63	62	3	9.4	51.5	7.1	13.6	36.8	39.3	3.2	( 5 )	
( 6 )	61	74	41	72	34	17	13.5	57.4	8.3	18.2	29.4	41.0	3.1	( 6 )	
( 7 )	65	75	42	75	36	7	15.4	60.4	8.7	20.5	25.1	42.4	3.3	( 7 )	
( 8 )	61	77	39	72	36	6	13.8	57.2	8.4	17.9	30.1	40.3	3.3	( 8 )	
( 9 )	58	68	44	68	24	3	10.0	54.3	7.5	14.7	34.4	40.6	2.8	( 9 )	
(10)	51	68	36	62	49	1	9.4	49.4	6.2	13.8	40.5	37.5	2.0	(10)	
(11)	63	74	50	67	15	5	18.1	56.9	10.8	24.5	21.9	40.1	2.7	(11)	
(12)	58	64	46	62	52	9	12.6	53.5	10.9	19.7	25.1	40.9	3.4	(12)	
(13)	65	74	53	72	54	2	13.3	60.4	10.4	18.0	31.8	36.6	3.2	(13)	
(14)	63	72	47	85	44	2	13.8	46.2	31.3	19.1	25.5	21.1	2.5	(14)	
(15)	56	75	41	32	59	3	14.2	52.0	11.0	18.9	37.7	29.2	3.2	(15)	
(16)	53	76	48	55	61	12	13.8	52.0	13.2	18.1	36.5	28.5	3.7	(16)	
(17)	63	73	45	75	47	2	13.6	58.8	10.2	18.6	30.6	37.4	3.2	(17)	
(18)	64	80	51	69	62	3	16.6	59.4	11.3	20.7	35.7	29.0	3.3	(18)	
(19)	53	73	39	58	44	5	14.1	48.3	11.3	19.3	35.8	30.5	2.6	(19)	
(20)	57	68	45	60	65	4	12.9	53.4	11.6	19.0	31.0	34.4	4.0	(20)	
(21)	47	55	39	43	80	2	7.8	51.5	11.4	14.2	43.1	21.5	9.8	(21)	
(22)	60	51	49	70	47	6	5.3	57.0	7.7	10.4	32.1	46.6	3.2	(22)	
(23)	61	65	57	64	54	1	8.6	57.7	8.5	18.2	36.4	39.1	2.8	(23)	
(24)	66	72	58	71	54	1	9.7	62.2	8.3	18.4	33.3	41.3	3.2	(24)	
(25)	59	52	60	60	57	1	6.6	54.6	10.9	12.7	37.0	36.3	3.1	(25)	
(26)	64	77	48	67	59	2	14.9	62.1	10.6	19.3	19.0	45.2	5.9	(26)	
(27)	59	76	43	59	63	6	12.8	52.4	12.6	16.8	35.1	31.7	3.3	(27)	
(28)	61	-8	56	71	38	11	-0.5	58.7	7.2	6.0	20.3	61.4	4.6	(28)	
(29)	71	-30	64	84	45	6	-1.5	73.1	3.4	5.1	16.2	69.7	5.6	(29)	
(30)	64	16	65	70	34	5	1.1	52.1	18.5	6.8	27.3	45.7	1.7	(30)	
(31)	73	65	47	89	88	2	9.6	84.2	6.7	14.7	15.1	53.4	10.1	(31)	
(32)	55	62	41	64	70	3	9.7	47.0	16.0	15.6	31.9	35.5	1.0	(32)	
(33)	70	44	86	75	80	6	9.0	57.2	19.3	20.4	19.3	39.3	1.2	(33)	
(34)	81	86	59	82	92	8	22.3	85.4	5.5	25.9	13.4	47.2	8.0	(34)	
(35)	73	76	64	76	74	3	20.7	69.3	6.7	27.2	20.0	45.2	0.9	(35)	
(36)	70	77	59	75	74	2	12.8	67.3	12.7	16.6	26.0	38.5	6.2	(36)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Banana meal .....	86.3	-0.4	64.3	.....	2.6	3.5	1.0	78.7	0.5	(1)
(2)	—peel meal .....	88.0	2.3	56.2	23.4	9.2	6.8	7.6	57.3	7.1	(2)
(3)	—plants, fed green .....	(16.0)	0.6	10.4	17.4	2.1	1.0	3.8	9.0	0.1	(3)
(4)	Barley hay .....	85.1	4.4	48.8	10.0	6.3	7.9	22.6	46.4	1.9	(4)
(5)	—hay, milk stage .....	84.3	3.5	43.1	11.4	6.6	7.1	27.3	41.7	1.6	(5)
(6)	—hay, dough stage .....	85.8	3.8	51.7	12.7	6.2	6.9	20.8	49.9	2.0	(6)
(7)	—hay, mature .....	85.0	3.4	52.5	14.4	6.4	6.2	16.4	54.7	1.3	(7)
(8)	—straw .....	82.3	0.7	40.7	58.6	5.1	4.0	34.7	36.4	2.1	(8)
(9)	—straw .....	84.6	0.6	39.5	65.7	5.7	3.0	39.3	35.2	1.4	(9)
(10)	—straw, winter .....	84.1	0.7	40.0	59.2	4.9	3.7	36.7	37.5	1.3	(10)
(11)	—straw, winter, treated with NaOH, wet .....	24.0	-0.6	14.1	.....	1.4	0.6	13.7	7.9	0.4	(11)
(12)	—fodder, fed green .....	23.9	2.5	15.3	5.1	2.1	3.5	6.1	11.4	0.8	(12)
(13)	—fodder, half bloom, fed green .....	20.4	2.6	13.2	4.2	2.0	3.5	5.0	9.1	0.8	(13)
(14)	—fodder, late bloom, fed green .....	23.4	2.5	14.8	4.9	2.2	3.6	7.0	9.7	0.9	(14)
(15)	—fodder, milk stage, fed green .....	27.8	2.2	18.1	7.2	2.0	3.2	6.3	15.5	0.8	(15)
(16)	—grain .....	91.2	7.4	63.2	7.6	12.0	10.2	6.7	61.2	1.1	(16)
(17)	—grain, all expts .....	88.9	9.9	76.8	6.8	2.5	12.5	4.4	67.5	2.0	(17)
(18)	—grain, heavy, screened .....	86.9	9.0	73.3	7.2	2.4	11.2	4.2	67.4	1.7	(18)
(19)	—grain, light weight .....	87.9	10.1	77.2	6.6	3.1	11.9	5.4	65.6	1.9	(19)
(20)	—small grains .....	88.3	8.5	78.5	8.3	2.5	10.9	3.5	69.2	2.2	(20)
(21)	—grain, under 4% fiber .....	88.1	9.4	78.2	7.3	2.4	11.6	3.4	68.6	2.0	(21)
(22)	—grain, 4-6% fiber .....	89.6	10.4	76.7	6.4	2.4	13.2	4.6	67.6	1.9	(22)
(23)	—grain, over 6% fiber .....	87.3	9.7	66.6	8.9	4.0	12.6	8.0	60.2	2.4	(23)
(24)	—grain, under 13.5% moisture .....	89.3	10.2	78.1	6.7	2.4	12.7	4.3	67.8	2.1	(24)
(25)	—grain, 13.5-16% moisture .....	86.3	10.2	66.9	5.6	3.6	13.0	7.5	60.5	1.7	(25)
(26)	—grain, sample grade, over 16% moisture .....	83.4	6.7	72.5	9.9	2.8	9.5	4.4	65.0	1.7	(26)
(27)	—grain, under 11% protein .....	87.2	8.0	77.3	8.6	2.4	10.2	3.7	69.0	1.9	(27)
(28)	—grain, 11% protein .....	88.9	10.7	75.6	6.1	2.8	13.1	5.4	65.6	2.0	(28)
(29)	—grain, 14% protein .....	90.4	11.0	78.7	6.2	2.3	14.3	4.1	67.7	2.0	(29)
(30)	—bran .....	89.0	4.2	48.6	10.6	7.5	7.5	22.3	49.4	2.3	(30)
(31)	—feed .....	87.0	12.1	59.2	3.9	5.0	15.0	13.6	49.4	4.0	(31)
(32)	—flour .....	86.0	8.8	75.2	7.6	1.1	12.5	1.0	70.1	1.3	(32)
(33)	—malt sprouts .....	90.9	23.4	62.6	1.7	6.0	25.6	15.0	42.8	1.5	(33)
(34)	—middlings .....	88.8	12.3	72.0	4.8	4.2	15.1	8.4	55.7	5.4	(34)
(35)	—mixed feed and screenings .....	89.5	6.3	48.2	6.7	6.2	9.0	17.9	53.4	3.0	(35)
(36)	—screenings .....	88.3	8.7	76.8	7.8	2.5	10.9	2.8	70.3	1.8	(36)
(37)	Barley corn horsebean sweet lupine oat vetch mixed fodder, prebloom, dried .....	(87.0)	13.1	49.0	2.7	9.7	18.8	28.4	27.8	2.3	(37)
(38)	Barley pea mixed fodder, fed green .....	22.6	3.1	14.2	3.5	1.9	4.1	5.4	10.2	1.0	(38)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
(1)	76	-12	-324	85	106	2	-0.5	74.5	3.0	4.1	1.2	91.1	0.6	(1)	
(2)	67	34	22	80	40	2	2.6	63.9	10.5	7.7	8.6	65.1	8.1	(2)	
(3)	74	55	54	85	58	2	3.5	65.0	13.1	6.4	23.7	56.0	0.8	(3)	
(4)	61	56	50	67	47	19	5.2	57.4	7.4	9.3	26.5	54.6	2.2	(4)	
(5)	54	49	52	57	44	1	4.1	51.1	7.8	8.4	32.4	49.5	1.9	(5)	
(6)	63	55	47	71	58	5	4.4	60.2	7.2	8.0	24.2	58.3	2.3	(6)	
(7)	66	55	41	75	46	1	4.0	61.8	7.5	7.3	19.3	65.4	1.5	(7)	
(8)	51	17	56	51	43	2	0.8	49.4	6.2	4.9	42.2	44.2	2.5	(8)	
(9)	49	20	57	43	42	6	0.7	46.7	6.7	3.5	46.5	41.6	1.7	(9)	
(10)	49	18	56	46	54	8	0.8	47.6	5.8	4.4	43.6	44.7	1.5	(10)	
(11)	63	-111	80	44	25	6	-2.7	58.9	5.8	2.4	57.1	33.0	1.7	(11)	
(12)	68	71	59	72	56	6	10.4	64.1	8.8	14.7	25.7	41.3	3.5	(12)	
(13)	69	73	65	70	53	2	12.6	64.3	9.8	17.2	24.5	44.6	3.9	(13)	
(14)	66	70	56	73	62	2	10.8	63.1	9.4	15.4	30.0	41.4	3.8	(14)	
(15)	68	69	56	74	49	2	7.9	65.1	7.2	11.5	22.7	55.7	2.9	(15)	
(16)	79	72	42	84	66	4	8.1	69.3	13.2	11.2	7.3	67.1	1.2	(16)	
(17)	37	79	45	91	30	44	11.1	86.4	2.8	14.1	5.0	75.9	2.2	(17)	
(18)	36	30	27	90	67	6	10.3	84.3	2.8	12.9	4.9	77.4	2.0	(18)	
(19)	33	85	58	92	32	8	11.5	87.8	3.5	13.5	6.1	74.7	2.2	(19)	
(20)	38	77	63	92	85	2	9.6	88.9	2.8	12.4	4.0	78.3	2.5	(20)	
(21)	38	31	33	93	30	14	10.7	88.8	2.7	13.2	3.9	77.9	2.3	(21)	
(22)	37	79	50	92	45	22	11.6	85.6	2.7	14.7	5.1	75.4	2.1	(22)	
(23)	78	77	37	32	33	3	11.1	76.3	4.6	14.4	9.2	69.0	2.8	(23)	
(24)	38	80	44	92	30	35	11.4	87.5	2.7	14.2	4.3	76.0	2.3	(24)	
(25)	30	78	39	84	78	2	11.8	77.5	4.2	15.1	8.7	70.0	2.0	(25)	
(26)	37	70	62	92	37	2	8.0	86.9	3.3	11.4	5.3	78.0	2.0	(26)	
(27)	29	79	43	93	30	12	9.2	88.6	2.8	11.7	4.3	79.1	2.1	(27)	
(28)	35	32	41	90	32	14	12.0	85.0	3.2	14.7	6.1	73.8	2.2	(28)	
(29)	37	77	46	92	78	13	12.2	87.1	2.5	15.3	4.5	75.0	2.2	(29)	
(30)	55	56	52	53	126	2	4.7	54.6	8.4	8.4	25.1	55.5	2.6	(30)	
(31)	67	31	18	74	90	4	13.9	68.1	5.3	17.2	15.6	56.8	4.6	(31)	
(32)	37	70	-244	97	36	2	10.2	87.5	1.3	14.5	1.2	81.5	1.5	(32)	
(33)	31	91	64	64	63	1	25.7	68.9	6.6	23.2	16.5	47.0	1.7	(33)	
(34)	77	32	39	30	97	1	13.9	31.1	4.7	17.0	9.5	62.7	6.1	(34)	
(35)	56	70	39	60	43	3	7.0	53.9	6.9	10.0	20.0	59.3	3.3	(35)	
(36)	37	30	-23	93	33	4	9.9	87.0	2.8	12.4	3.2	79.5	2.1	(36)	
(37)	63	70	53	68	36	1	15.1	56.3	11.2	21.6	32.6	32.0	2.6	(37)	
(38)	66	76	52	68	59	4	13.9	62.9	8.2	18.3	23.8	45.3	4.4	(38)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Barley pea mixed fodder, full bloom, fed green	19.9	3.1	11.5	2.7	1.7	4.0	5.0	8.3	0.9	(1)
(2)	—mixed fodder, late bloom, fed green....	25.3	3.0	17.3	4.9	2.0	4.0	5.9	12.4	1.0	(2)
(3)	Barnyardgrass hay, post-bloom.....	84.2	5.6	44.9	7.1	7.7	9.8	31.0	33.9	1.8	(3)
(4)	Bean hay, green, dehydrated	88.5	10.4	56.3	4.5	8.0	15.0	22.4	39.7	3.4	(4)
(5)	Bean hay, moth.....	86.2	9.9	45.7	3.6	10.3	14.8	25.3	34.3	1.5	(5)
(6)	Bean hay meal, dehydrated	90.3	10.4	59.6	4.7	8.7	14.8	22.3	40.8	3.7	(6)
(7)	Bean straw, kidney.....	84.5	3.7	49.3	12.2	6.2	6.9	31.0	38.9	1.5	(7)
(8)	Bean silage, HCl added....	19.3	1.7	9.7	4.6	3.8	2.6	5.4	6.9	0.6	(8)
(9)	—bran.....	89.2	.....	62.4	.....	3.7	3.7	42.5	38.9	0.4	(9)
(10)	—bran and meal.....	89.2	5.8	61.4	9.6	2.1	10.7	38.2	37.8	0.4	(10)
(11)	—seed.....	83.6	23.2	73.1	2.1	3.1	26.4	6.9	45.9	1.3	(11)
(12)	Beans, seed, kidney.....	87.8	13.6	68.0	4.0	3.6	20.3	4.2	58.5	1.2	(12)
(13)	Beans, seed, pinto.....	90.7	20.0	80.3	3.0	4.3	23.0	4.0	58.0	1.4	(13)
(14)	Bean corn pea vetch mixed silage.....	15.7	3.1	9.6	2.1	2.4	3.9	3.6	4.9	0.9	(14)
(15)	—mixed silage, HCOOH added.....	15.9	3.1	9.9	2.2	2.2	3.9	3.6	5.4	0.8	(15)
(16)	—mixed silage, HCONH <sub>2</sub> , NaNO <sub>3</sub> added.....	16.7	3.4	10.8	2.2	2.4	4.2	3.9	5.4	0.8	(16)
(17)	—mixed silage, H <sub>2</sub> SO <sub>4</sub> added.....	16.3	3.1	9.9	2.2	2.4	3.8	3.7	5.7	0.7	(17)
(18)	Bean oat pea heavy vetch mixed hay, dried on ridges	89.4	12.9	42.1	2.3	9.1	17.3	30.2	30.8	2.0	(18)
(19)	Bean oat pea vetch mixed fodder, fed green....	11.6	2.2	6.2	1.8	2.9	2.9	2.5	3.0	0.3	(19)
(20)	—mixed silage, mature, molasses added.....	22.8	1.8	13.2	6.5	2.6	3.1	7.1	9.4	0.6	(20)
(21)	Bean vetch mixed hay, early bloom, dehydrated...	(87.0)	15.1	52.7	2.5	11.6	20.2	25.0	27.6	2.6	(21)
(22)	Beechnut oil feed with hulls	87.0	11.8	36.9	2.1	7.1	17.0	23.4	35.2	4.3	(22)
(23)	Beet crowns and tops, sugar, dehydrated.....	(82.6)	7.0	49.1	6.0	13.4	11.0	14.5	42.6	1.1	(23)
(24)	—crowns and tops, sugar, dehydrated.....	82.6	5.6	49.5	7.8	18.4	9.7	9.7	43.9	0.9	(24)
(25)	—roots and tops, sugar, dehydrated.....	86.9	5.4	63.3	10.7	9.3	8.3	15.0	53.8	0.5	(25)
(26)	—seed hulls, sugar.....	85.3	6.2	28.9	3.7	8.4	11.1	28.2	35.5	2.1	(26)
(27)	—straw, sugar.....	81.6	2.2	24.7	10.2	8.3	5.4	35.2	31.9	0.8	(27)
(28)	—tops, sugar, dry.....	89.8	8.0	59.2	6.4	18.2	11.1	8.5	50.8	1.2	(28)
(29)	—tops, sugar, dry.....	89.8	6.8	50.9	6.4	22.4	10.7	11.8	43.6	1.3	(29)
(30)	—taproots, sugar, dried..	89.1	2.9	56.1	18.2	16.5	6.5	10.1	55.4	0.6	(30)
(31)	—tops, sugar, dehydrated	86.3	6.4	54.8	7.5	16.1	10.4	9.2	49.7	0.9	(31)
(32)	—tops, sugar, washed, chopped, and dried..	90.8	6.8	55.6	7.2	15.2	11.0	10.3	53.3	1.0	(32)
(33)	—sugar, roots.....	11.3	0.6	9.8	15.3	1.0	0.8	0.8	8.6	0.1	(33)
(34)	—sugar, roots.....	16.2	1.4	15.0	9.6	1.1	1.6	0.9	12.5	0.1	(34)
(35)	—crowns, sugar, fed green	15.9	2.1	9.5	3.5	3.2	2.7	1.7	8.0	0.3	(35)
(36)	—crowns and tops, sugar fed green.....	14.0	1.7	11.0	5.3	2.0	2.1	1.5	7.9	0.5	(36)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%						%	
( 1 )	60	77	43	61	60	2	15.5	57.8	8.5	20.1	25.1	41.8	4.5	( 1 )	
( 2 )	71	74	61	76	59	2	11.7	68.4	7.9	15.8	23.3	49.0	4.0	( 2 )	
( 3 )	58	57	61	53	60	2	6.6	53.3	9.1	11.6	36.8	40.4	2.1	( 3 )	
( 4 )	66	69	46	74	82	2	11.7	63.6	9.0	16.9	25.3	45.0	3.8	( 4 )	
( 5 )	60	67	52	65	10	2	11.5	53.0	12.0	17.2	29.4	39.7	1.7	( 5 )	
( 6 )	68	70	48	77	85	2	11.5	66.0	9.6	16.4	24.7	45.2	4.1	( 6 )	
( 7 )	62	54	51	72	53	2	4.4	58.4	7.3	8.2	36.7	46.0	1.8	( 7 )	
( 8 )	60	66	37	75	57	18	9.0	50.1	19.6	13.6	27.8	36.0	3.0	( 8 )	
( 9 )	68	0	85	65	100	4	.....	69.9	4.2	4.2	47.6	43.5	0.5	( 9 )	
(10)	70	54	68	76	104	2	6.5	68.9	2.4	12.0	42.8	42.3	0.5	(10)	
(11)	89	88	74	92	85	34	27.8	87.4	3.7	31.6	8.3	54.8	1.6	(11)	
(12)	80	67	49	88	35	2	15.5	77.5	4.1	23.1	4.8	66.6	1.4	(12)	
(13)	91	87	62	96	65	2	22.1	88.5	4.7	25.4	4.4	64.0	1.5	(13)	
(14)	66	80	54	61	77	2	19.9	61.2	15.2	24.9	22.7	31.6	5.6	(14)	
(15)	66	80	50	67	74	2	19.6	62.4	13.6	24.5	22.8	33.9	5.2	(15)	
(16)	70	81	58	69	76	2	20.4	64.6	14.4	25.2	23.2	32.2	5.0	(16)	
(17)	66	82	45	69	74	2	19.2	60.9	14.9	23.4	22.4	34.7	4.6	(17)	
(18)	51	74	37	51	54	2	14.4	47.1	10.2	19.4	33.8	34.4	2.2	(18)	
(19)	69	78	61	68	50	2	19.2	53.1	25.0	24.6	21.2	26.6	2.6	(19)	
(20)	63	57	62	65	71	2	7.8	58.1	11.6	13.6	31.2	40.8	2.8	(20)	
(21)	67	75	50	77	65	3	17.4	60.6	13.3	23.2	23.7	31.8	3.0	(21)	
(22)	40	70	21	31	96	2	13.6	42.4	8.2	19.5	26.9	40.5	4.9	(22)	
(23)	70	64	49	82	0	1	8.5	59.5	16.2	13.3	17.5	51.7	1.3	(23)	
(24)	77	58	75	83	5	16	6.8	59.9	22.3	11.7	11.7	53.2	1.1	(24)	
(25)	83	65	85	88	-189	2	6.2	72.8	10.7	9.6	17.3	61.8	0.6	(25)	
(26)	35	56	11	46	70	6	7.3	33.9	9.9	13.0	33.1	41.5	2.5	(26)	
(27)	34	41	25	41	36	4	2.7	30.3	10.2	6.6	43.1	39.1	1.0	(27)	
(28)	83	72	73	87	29	5	8.9	65.9	20.3	12.4	9.5	56.5	1.3	(28)	
(29)	75	64	72	80	26	16	7.6	56.7	25.0	11.9	13.1	48.6	1.4	(29)	
(30)	78	45	72	86	-118	2	3.3	63.0	13.5	7.3	11.3	62.2	0.7	(30)	
(31)	73	62	73	83	23	14	7.4	63.5	13.7	12.0	10.7	57.5	1.1	(31)	
(32)	72	62	59	79	25	6	7.5	61.2	16.7	12.1	11.3	58.8	1.1	(32)	
(33)	94	73	76	99	50	1	5.3	86.9	8.8	7.3	7.1	76.1	0.7	(33)	
(34)	99	91	101	100	50	2	8.7	92.5	6.8	9.6	5.4	77.3	0.9	(34)	
(35)	74	79	61	76	38	1	13.3	60.0	19.9	16.8	10.4	51.1	1.8	(35)	
(36)	88	84	80	91	69	1	12.4	78.5	14.0	14.8	10.4	57.0	3.8	(36)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutri-tive ratio	Ash	Crude protein	Crude fiber	N-free ex-tract	Ether ex-tract	
		%	%	%	1:	%	%	%	%	%	
(1)	Beet crowns and tops, sugar, fed green.....	17.3	2.1	10.8	4.2	4.0	2.8	1.9	8.2	0.4	(1)
(2)	—tops, sugar, fed green..	10.0	2.1	6.9	2.3	2.4	2.5	1.0	3.7	0.4	(2)
(3)	—tops, sugar, prebloom, fed green.....	13.4	1.3	7.9	5.0	3.0	1.7	1.3	7.2	0.2	(3)
(4)	—tops, sugar, fed green (Goats).....	8.4	1.6	5.2	2.2	2.1	2.0	0.8	3.0	0.5	(4)
(5)	—crown and top silage, sugar.....	12.6	1.5	8.9	5.1	2.3	1.9	1.7	6.2	0.5	(5)
(6)	—crown and top silage, sugar.....	23.4	1.8	9.9	4.6	9.7	2.9	2.7	7.6	0.5	(6)
(7)	—crown and top silage, sugar, washed.....	14.0	1.0	7.5	6.2	3.5	1.9	2.7	5.6	0.3	(7)
(8)	—pulp silage.....	12.3	0.9	8.6	8.8	0.8	1.4	2.9	7.1	0.1	(8)
(9)	—pulp and top silage....	15.9	1.6	11.6	6.2	2.1	2.4	2.1	8.7	0.6	(9)
(10)	—pulp silage, potato flakes added.....	17.9	1.3	14.7	10.4	0.9	1.8	3.0	12.1	0.1	(10)
(11)	—silage, sugar, roots....	9.3	0.4	5.7	11.8	0.6	1.1	1.7	5.5	0.4	(11)
(12)	—top silage, sugar.....	14.1	1.2	8.4	6.2	3.2	1.7	1.8	6.8	0.6	(12)
(13)	—top silage, sugar, all expts	16.6	1.2	9.2	6.7	5.1	1.7	1.6	7.9	0.3	(13)
(14)	—top silage, sugar, washed before ensiling.....	12.6	1.0	8.0	7.0	2.6	1.4	1.4	6.9	0.3	(14)
(15)	—top silage, sugar, prebloom, A. I. V.....	20.5	1.5	9.7	5.6	7.5	2.4	2.3	8.0	0.3	(15)
(16)	—top silage, sugar, PCl <sub>5</sub> added.....	(16.3)	1.7	11.1	5.5	3.0	2.2	1.6	9.3	0.2	(16)
(17)	—top silage, sugar, potato flakes added.....	20.4	1.2	10.2	7.8	7.6	1.9	1.8	8.9	0.2	(17)
(18)	Beets, sugar, roots, dried (Goats)	92.8	1.4	73.5	52.2	3.2	4.2	4.7	80.2	0.5	(18)
(19)	Beet pulp, dried.....	89.2	4.3	64.4	14.2	6.1	8.5	20.2	54.0	0.4	(19)
(20)	—pulp, dried.....	88.4	4.6	65.4	14.3	5.3	7.9	17.1	57.5	0.6	(20)
(21)	—pulp, wet.....	12.5	0.7	9.5	12.1	0.6	1.3	2.6	7.9	0.1	(21)
(22)	—pulp, molasses added, dried	90.4	6.3	70.9	10.2	6.0	9.6	14.4	59.9	0.5	(22)
(23)	—pulp, Stephen's process, dried (Goats).....	89.8	2.6	62.9	23.5	4.6	7.5	12.9	63.6	1.2	(23)
(24)	—pulp, urea added, dried	90.8	36.1	63.4	0.8	4.4	53.9	14.5	17.8	0.2	(24)
(25)	Beet top corn stover mixed silage.....	17.5	1.2	9.3	6.9	3.5	1.9	4.1	7.4	0.6	(25)
(26)	Beet top curly leaf mallow mixed silage.....	16.0	2.3	9.0	3.0	3.9	2.9	2.2	6.4	0.6	(26)
(27)	Bentgrass grass mixed hay	84.2	4.7	49.8	9.6	8.1	8.1	24.2	41.6	2.2	(27)
(28)	Bentgrass hay, colonial.....	85.5	2.5	47.5	18.5	6.0	5.8	25.9	46.2	1.6	(28)
(29)	—hay, overripe.....	87.0	2.5	40.9	15.3	5.6	6.8	28.1	44.9	1.6	(29)
(30)	Bentgrass, colonial, saltgrass mixed hay.....	82.0	3.4	42.2	11.2	5.8	7.2	22.6	44.7	1.7	(30)
(31)	Bermudagrass hay.....	91.5	3.7	44.1	11.0	8.0	7.2	27.5	47.2	1.6	(31)
(32)	Bladekelp, dry.....	83.7	6.0	39.9	5.6	16.8	11.4	8.6	45.8	1.1	(32)
(33)	Blood meal.....	88.8	59.5	60.2	0	3.5	83.7	0.8	0.7	0.5	(33)
(34)	Blood, soluble, dried.....	89.0	82.4	83.8	0	2.5	85.9	.....	.....	0.6	(34)
(35)	Bluegrass hay.....	83.5	6.3	52.7	7.3	5.9	10.0	20.6	44.9	2.1	(35)
(36)	Bluegrass hay, Kentucky...	84.2	5.6	50.5	8.2	7.2	9.5	25.2	40.0	2.3	(36)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS							Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
							%	%	%	%	%	%	%	
(1)	80	75	79	83	46	6	12.0	62.7	23.0	16.0	11.0	47.4	2.6	(1)
(2)	87	83	110	86	54	4	20.6	68.6	23.6	24.8	9.8	38.2	3.6	(2)
(3)	75	79	82	73	54	2	9.8	58.9	22.4	12.4	9.5	54.3	1.4	(3)
(4)	75	83	65	74	67	2	19.3	61.7	25.0	23.3	9.9	35.3	6.5	(4)
(5)	82	79	85	84	62	1	11.6	70.4	18.1	14.7	13.7	49.6	3.9	(5)
(6)	72	62	75	76	28	8	7.6	42.5	41.3	12.2	11.7	32.8	2.0	(6)
(7)	70	54	78	75	32	2	7.4	53.6	25.3	13.8	19.5	39.0	2.4	(7)
(8)	75	64	68	83	-66	8	7.2	70.1	6.5	11.2	23.6	57.9	0.8	(8)
(9)	81	68	82	85	65	2	10.1	73.3	13.0	14.9	13.1	55.2	3.8	(9)
(10)	85	71	78	90	140	1	7.2	82.4	5.1	10.2	16.5	67.8	0.4	(10)
(11)	63	39	62	71	32	3	4.8	60.9	6.5	12.2	18.1	58.7	4.5	(11)
(12)	74	67	75	77	48	4	8.3	59.6	22.4	12.4	12.8	48.2	4.2	(12)
(13)	78	68	84	81	42	30	7.1	55.2	30.9	10.5	9.7	47.1	1.8	(13)
(14)	79	70	75	83	43	9	8.0	63.8	20.7	11.4	11.1	54.6	2.2	(14)
(15)	74	62	85	75	35	1	7.1	47.4	36.5	11.5	11.4	38.9	1.7	(15)
(16)	83	77	79	87	13	5	10.4	68.0	18.4	13.5	10.1	56.5	1.5	(16)
(17)	79	60	75	85	29	1	5.7	50.0	37.1	9.5	8.8	43.6	1.0	(17)
(18)	81	33	-31	91	-65	2	1.5	79.3	3.4	4.5	5.1	86.5	0.5	(18)
(19)	79	50	83	84	-251	4	4.8	72.2	6.3	9.5	22.6	60.7	0.4	(19)
(20)	82	58	74	88	-174	17	5.2	74.0	6.0	8.9	19.4	65.0	0.7	(20)
(21)	81	55	82	88	-72	6	5.8	76.3	5.1	10.6	20.6	62.7	1.0	(21)
(22)	85	66	78	91	-128	7	7.0	78.4	6.6	10.6	15.9	66.4	0.5	(22)
(23)	72	34	63	79	72	1	2.9	70.0	5.1	8.4	14.4	70.8	1.3	(23)
(24)	88	67	82	92	-253	4	39.8	69.8	4.3	59.4	16.0	19.6	0.2	(24)
(25)	63	62	71	60	55	1	6.7	53.1	19.8	10.8	23.7	42.4	3.3	(25)
(26)	71	77	44	77	62	4	14.1	56.0	24.5	18.3	13.8	39.6	3.8	(26)
(27)	64	58	65	66	39	1	5.6	59.2	9.6	9.6	28.8	49.4	2.6	(27)
(28)	59	42	63	60	30	4	2.9	55.6	7.0	6.8	30.3	54.0	1.9	(28)
(29)	49	37	57	46	49	1	2.9	47.0	6.5	7.8	32.3	51.6	1.8	(29)
(30)	54	48	60	53	40	3	4.2	51.5	7.1	8.8	27.6	54.4	2.1	(30)
(31)	52	51	52	52	44	11	4.0	48.2	8.7	7.9	30.1	51.6	1.7	(31)
(32)	71	53	0	74	0	1	7.2	47.7	20.1	13.6	10.3	54.7	1.3	(32)
(33)	73	71	18	25	38	17	67.0	67.8	3.9	94.3	0.9	0.8	0.6	(33)
(34)	96	96	..	..	100	1	92.6	94.2	2.8	96.5	..	..	0.7	(34)
(35)	66	63	66	68	49	3	7.6	63.1	7.1	12.0	24.7	53.7	2.5	(35)
(36)	64	58	67	64	50	14	6.6	60.0	8.6	11.3	29.9	47.5	2.7	(36)



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Bluegrass hay, full bloom...	85.6	6.3	53.4	7.4	6.5	10.3	27.0	39.4	2.4	(1)
(2)	Bluegrass hay, Sanburg....	93.6	5.1	49.8	8.7	6.0	8.0	30.5	46.2	2.9	(2)
(3)	Bluegrass clover timothy mixed hay.....	83.2	4.1	49.9	11.3	5.0	7.7	28.5	40.3	1.7	(3)
(4)	—mixed hay, prebloom...	83.4	6.0	54.5	8.0	6.2	9.8	26.2	39.4	1.8	(4)
(5)	—mixed hay, early bloom	82.9	3.9	49.6	11.8	4.7	7.2	28.8	40.5	1.7	(5)
(6)	—mixed hay, late bloom.	83.2	2.6	45.3	16.3	4.0	6.1	30.6	41.2	1.3	(6)
(7)	Bluegrass, Kentucky, clover sweet vernal grass-mixed hay.....	89.6	4.3	53.0	11.3	5.7	8.0	29.7	43.9	2.3	(7)
(8)	Bluegrass, Kentucky, red clover mixed hay, full bloom.....	86.6	6.6	56.0	7.6	5.9	10.6	28.9	38.7	2.5	(8)
(9)	Bluegrass, Kentucky, white clover mixed hay....	88.1	5.9	37.6	5.4	6.5	12.2	30.0	37.6	1.8	(9)
(10)	—mixed, immature, dried	87.6	8.2	41.1	4.0	7.6	14.7	25.9	36.9	2.5	(10)
(11)	—mixed hay, prebloom...	87.9	8.5	46.5	4.5	7.6	14.4	24.8	38.4	2.7	(11)
(12)	—mixed hay, early bloom	89.2	7.0	49.2	6.0	7.4	12.3	28.2	39.2	2.1	(12)
(13)	—mixed hay, late bloom.	88.4	5.0	33.4	5.6	5.7	12.0	32.3	37.0	1.4	(13)
(14)	—mixed hay, mature....	88.0	4.5	34.2	6.7	6.2	10.9	32.9	36.6	1.4	(14)
(15)	—mixed hay, overripe....	87.2	5.1	30.8	5.1	5.8	11.7	31.9	36.3	1.6	(15)
(16)	Bluegrass, Kentucky, grass mixed hay, full bloom	89.1	5.1	56.0	10.0	6.0	8.6	27.7	44.4	2.4	(16)
(17)	Bluegrass, Kentucky, grass legume mixed hay...	88.4	2.5	47.9	18.7	5.9	5.9	28.7	46.0	1.9	(17)
(18)	Bluegrass, Kentucky, sweet vernalgrass hay....	89.5	3.7	52.4	13.3	6.1	7.3	28.6	45.2	2.3	(18)
(19)	Bluestem, India, late bloom, fed green.....	(20.0)	0.8	12.7	15.7	0.9	1.5	7.9	9.4	0.3	(19)
(20)	Bone meal.....	97.0	17.1	4.8	0.1	63.8	24.7	.....	.....	3.2	(20)
(21)	—low ash.....	95.2	26.6	42.7	0.6	43.9	39.0	.....	.....	7.5	(21)
(22)	Bone horn dried "stick" mixed meal.....	87.9	66.9	65.0	0	8.6	77.8	.....	1.1	0.4	(22)
(23)	Brewers' dried grains.....	88.9	16.0	61.7	2.9	3.8	21.6	14.3	42.4	6.8	(23)
(24)	—dried grains, 18% protein.....	88.9	14.7	60.8	3.1	4.1	20.7	14.0	43.4	6.8	(24)
(25)	—dried grains, 23% protein.....	88.9	18.8	64.2	2.4	3.4	26.6	15.1	40.2	6.7	(25)
(26)	Broadbean pod meal.....	92.5	4.9	57.0	10.6	6.8	15.4	16.5	52.8	1.0	(26)
(27)	Brome hay, prebloom.....	93.0	6.2	55.8	7.9	7.1	10.8	32.3	40.6	2.2	(27)
(28)	Brome hay, cheatgrass, early bloom.....	86.5	4.1	47.7	10.8	5.9	7.5	32.1	39.1	1.9	(28)
(29)	Brome hay, mountain.....	93.3	5.9	52.7	7.9	7.6	8.7	31.5	44.5	1.0	(29)
(30)	Brome hay, smooth.....	87.2	2.6	46.6	16.6	7.8	5.8	29.0	42.6	2.0	(30)
(31)	—hay (Goats).....	85.6	3.0	46.1	14.6	9.8	6.2	26.9	40.1	2.6	(31)
(32)	—hay, prebloom.....	83.2	4.1	42.9	9.6	9.3	7.8	26.6	37.3	2.2	(32)
(33)	—hay, late bloom.....	85.4	2.8	47.1	15.7	7.2	5.3	30.4	40.5	2.0	(33)
(34)	—hay, mature.....	91.8	1.4	45.8	31.4	6.9	5.0	33.4	44.8	1.7	(34)
(35)	—hay, mature.....	88.4	0.5	42.1	84.0	5.0	3.5	32.2	45.9	1.8	(35)
(36)	—4 inches, high fed green	37.2	4.5	29.9	5.7	4.0	5.4	7.7	18.4	1.7	(36)
(37)	—10 inches high, fed green.....	37.5	3.6	29.8	7.3	2.8	4.5	10.6	18.4	1.2	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
( 1 )	65	62	67	66	54	3	7.4	62.4	7.6	12.0	31.6	46.0	2.8	( 1 )	
( 2 )	55	64	45	60	50	2	5.5	53.2	6.4	8.6	32.6	49.3	3.1	( 2 )	
( 3 )	64	53	59	68	43	65	4.9	60.0	6.0	9.2	34.3	48.5	2.0	( 3 )	
( 4 )	70	62	68	73	47	12	7.2	65.4	7.4	11.7	31.4	47.3	2.2	( 4 )	
( 5 )	62	54	57	68	45	23	4.7	59.8	5.7	8.7	34.7	48.9	2.0	( 5 )	
( 6 )	57	43	51	63	37	23	3.1	54.4	4.8	7.3	36.8	49.5	1.6	( 6 )	
( 7 )	62	54	66	61	43	29	4.8	59.1	6.4	8.9	33.2	48.9	2.6	( 7 )	
( 8 )	68	62	74	65	52	7	7.6	64.7	6.8	12.2	33.4	44.7	2.9	( 8 )	
( 9 )	47	48	48	47	-7	10	6.7	42.7	7.4	13.9	34.1	42.5	2.1	( 9 )	
(10)	50	56	51	50	21	2	9.4	46.9	8.7	16.8	29.6	42.0	2.9	(10)	
(11)	56	59	51	60	38	2	9.7	52.9	8.6	16.4	28.2	43.7	3.1	(11)	
(12)	60	57	61	62	15	2	7.9	55.2	8.3	13.8	31.6	44.0	2.3	(12)	
(13)	38	42	39	38	55	2	5.7	37.8	6.4	13.6	36.5	41.9	1.6	(13)	
(14)	42	41	48	39	-12	2	5.1	38.9	7.0	12.4	37.4	41.6	1.6	(14)	
(15)	38	43	43	36	-29	2	5.8	35.3	6.6	13.4	36.6	41.6	1.8	(15)	
(16)	65	59	68	66	50	8	5.7	62.8	6.7	9.7	31.1	49.8	2.7	(16)	
(17)	59	41	56	60	43	5	2.8	54.2	6.7	6.7	32.5	51.9	2.2	(17)	
(18)	61	50	64	62	45	23	4.1	58.5	6.8	8.2	32.0	50.4	2.6	(18)	
(19)	65	50	72	62	60	1	3.8	63.6	4.3	7.6	39.7	46.7	1.7	(19)	
(20)	28	69	..	..	-171	8	17.6	4.9	65.3	25.5	.....	.....	3.3	(20)	
(21)	79	68	..	..	96	2	27.9	44.9	46.1	41.0	.....	.....	7.9	(21)	
(22)	73	86	..	..	-230	3	76.1	74.0	9.8	88.5	.....	1.3	0.4	(22)	
(23)	64	74	47	61	86	17	18.0	69.4	4.3	24.3	16.1	47.7	7.6	(23)	
(24)	63	71	46	62	84	11	16.5	68.4	4.6	23.3	15.7	48.8	7.6	(24)	
(25)	66	80	54	59	90	5	21.2	72.2	3.8	26.5	17.0	45.2	7.5	(25)	
(26)	66	32	58	78	55	2	5.3	61.6	7.3	16.6	17.8	57.2	1.1	(26)	
(27)	64	58	68	65	24	1	6.7	60.0	7.6	11.6	34.7	43.7	2.4	(27)	
(28)	58	54	55	60	61	5	4.7	55.2	6.8	8.7	37.1	45.2	2.2	(28)	
(29)	61	68	53	67	16	2	6.3	56.5	8.2	9.3	33.8	47.6	1.1	(29)	
(30)	58	46	55	62	36	17	3.0	53.5	9.0	6.6	33.3	48.8	2.3	(30)	
(31)	59	48	59	61	47	6	3.5	53.9	11.4	7.2	31.4	46.9	3.1	(31)	
(32)	56	52	55	58	53	2	4.9	51.6	11.2	9.4	32.0	44.7	2.7	(32)	
(33)	59	53	56	64	28	6	3.3	55.1	8.4	6.2	35.6	47.5	2.3	(33)	
(34)	52	28	49	58	54	2	1.5	49.9	7.5	5.5	36.4	48.7	1.9	(34)	
(35)	49	14	43	56	51	1	0.6	47.6	5.6	4.0	36.4	52.0	2.0	(35)	
(35)	86	82	85	89	66	3	12.0	80.3	10.7	14.6	20.8	49.4	4.5	(36)	
(37)	83	79	83	85	69	6	9.6	79.6	7.5	12.1	28.3	48.9	3.2	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
				%	1:	%	%	%	%	%	
(1)	Brome, soft, fescue slender oat mixed hay.....	89.5	-0.9	38.5	.....	7.6	3.6	35.9	41.2	1.2	(1)
(2)	Brome, soft, grass mixed hay, overripe, weathered..	(87.0)	-0.3	44.4	.....	4.9	3.7	31.5	45.9	1.0	(2)
(3)	Brome vetch mixed silage..	19.8	1.5	12.3	7.3	1.9	2.2	6.9	7.9	0.9	(3)
(4)	Buckwheat hulls.....	84.6	0.2	13.3	61.7	1.1	3.0	41.4	38.7	0.4	(4)
(5)	—seed.....	93.0	8.8	65.3	6.4	2.4	12.3	11.7	64.2	2.4	(5)
(6)	—middlings.....	90.7	21.8	73.6	2.4	4.4	25.6	8.2	45.8	6.7	(6)
(7)	Buffalograss hay.....	92.7	3.8	48.0	11.6	11.6	7.0	27.6	45.3	1.2	(7)
(8)	Bulrush hay, sea.....	77.0	3.4	31.3	8.2	8.1	7.9	23.9	35.4	1.7	(8)
(9)	Burclover hay, California...	88.7	11.5	51.3	3.4	8.2	16.5	22.1	39.6	2.3	(9)
(10)	—hay, full bloom.....	88.4	10.8	50.8	3.7	7.6	15.6	22.3	40.5	2.4	(10)
(11)	—hay, late bloom.....	90.3	19.0	56.8	2.0	12.1	23.5	20.9	31.7	2.1	(11)
(12)	Buttercup fodder, full bloom, dried.....	89.6	5.1	50.1	8.9	6.0	9.0	30.5	40.8	3.3	(12)
(13)	Buttermilk, dried.....	91.5	28.4	85.3	2.0	7.3	31.5	.....	46.8	5.9	(13)
(14)	Cabbage, whole, fed green...	11.7	2.2	9.7	3.4	1.4	2.6	1.2	6.3	0.2	(14)
(15)	—outside leaves removed, fed green.....	9.7	1.5	8.9	4.9	0.8	1.7	1.0	6.1	0.1	(15)
(16)	—leaves, fed green.....	19.0	1.6	14.0	7.6	2.3	2.4	2.2	11.6	0.5	(16)
(17)	Cactus, pricklypear, fed green	21.1	0.6	12.6	19.7	3.0	1.2	2.9	13.1	0.9	(17)
(18)	Canarygrass hay, reed.....	85.7	5.7	42.3	6.5	8.0	9.0	31.1	36.1	1.5	(18)
(19)	Canna tops, very immature, fed green.....	16.5	0.7	7.7	9.4	2.7	1.7	3.2	8.1	0.8	(19)
(20)	—tubers.....	30.7	0.5	25.2	50.9	2.3	1.1	1.0	26.1	0.2	(20)
(21)	Carob pods.....	78.3	0.8	54.0	65.4	3.9	4.7	7.2	62.0	0.5	(21)
(22)	—seed.....	85.2	6.7	68.6	9.2	3.3	12.8	8.9	58.6	1.6	(22)
(23)	Carrots, roots.....	12.2	0.9	10.6	10.9	1.2	1.2	1.0	8.7	0.1	(23)
(24)	Casein.....	90.9	78.9	87.0	0.1	2.4	81.4	.....	5.9	1.2	(24)
(25)	Cassava roots.....	32.1	.....	25.8	.....	1.5	1.3	1.6	27.4	0.3	(25)
(26)	—seed oil meal.....	87.2	-1.1	75.6	.....	1.9	1.4	2.2	81.2	0.5	(26)
(27)	Chaenostoma fodder, late bloom, dried.....	(87.0)	1.7	37.0	21.3	4.6	4.6	35.6	41.2	1.0	(27)
(28)	Charlock seed oil meal.....	91.6	24.6	58.7	1.4	10.0	30.4	13.5	32.5	5.2	(28)
(29)	Chestnut residue from starch extraction, with shells	89.0	-1.2	45.1	.....	1.4	5.8	15.4	62.6	3.7	(29)
(30)	Chickpea, gram, seed.....	85.3	15.0	72.9	3.8	2.7	19.3	8.0	51.2	4.1	(30)
(31)	Chicory roots, dried.....	88.2	3.4	78.8	22.5	3.8	4.6	4.1	75.2	0.5	(31)
(32)	Clover hay, all expts.....	83.7	7.4	47.9	5.4	6.2	12.0	26.9	36.7	1.9	(32)
(33)	—hay.....	88.8	5.8	49.0	7.5	6.0	10.3	30.5	40.1	1.9	(33)
(34)	—hay, full bloom.....	85.1	6.6	45.4	5.9	5.6	11.8	29.4	36.2	2.1	(34)
(35)	—hay, late bloom.....	88.1	5.9	47.8	7.1	6.3	10.0	30.0	38.9	2.9	(35)
(36)	—hay, air dried.....	96.0	7.8	57.2	6.4	7.8	12.1	32.1	42.2	1.8	(36)
(37)	—hay, stubble, dehydrated.....	89.5	10.9	55.0	4.0	8.2	16.8	21.3	40.4	2.8	(37)
(38)	—hay, dehydrated.....	85.4	7.1	57.1	7.2	6.0	10.8	26.6	39.4	2.6	(38)
(39)	—hay, full bloom, dehydrated.....	85.0	7.4	56.4	6.6	6.8	11.7	26.0	38.7	1.8	(39)
(40)	—hay, dried on riders.....	90.2	7.9	55.7	6.0	6.6	12.3	28.7	40.6	2.0	(40)
(41)	—hay, early bloom, dried on riders.....	83.0	9.2	47.9	4.2	6.6	13.8	24.8	36.0	1.8	(41)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
							%	%	%	%	%	%	%		
( 1 )	46	-25	55	45	39	3	-1.0	43.0	8.5	4.0	40.1	46.0	1.4	( 1 )	
( 2 )	53	-10	63	52	44	4	-0.4	51.0	5.6	4.2	36.2	52.8	1.2	( 2 )	
( 3 )	64	68	69	59	68	1	7.6	62.3	9.5	11.1	34.8	39.9	4.7	( 3 )	
( 4 )	16	7	8	25	9	1	0.2	15.7	1.3	3.6	48.9	45.7	0.5	( 4 )	
( 5 )	70	72	45	73	80	4	9.5	70.2	2.6	13.2	12.6	69.0	2.6	( 5 )	
( 6 )	77	85	5	83	89	3	24.0	81.2	4.8	28.2	9.0	50.6	7.1	( 6 )	
( 7 )	58	54	60	59	37	2	4.1	51.8	12.5	7.6	29.8	48.8	1.3	( 7 )	
( 8 )	43	43	52	38	52	2	4.4	40.6	10.5	10.3	31.0	46.0	2.2	( 8 )	
( 9 )	63	70	53	66	36	17	13.0	57.8	9.2	18.6	24.9	44.7	2.6	( 9 )	
(10)	61	69	52	65	40	15	12.2	57.5	8.6	17.7	25.2	45.8	2.7	(10)	
(11)	72	81	64	76	5	2	21.1	62.9	13.4	26.0	23.1	35.2	2.3	(11)	
(12)	57	56	41	67	70	1	5.7	55.9	6.7	10.1	34.0	45.5	3.7	(12)	
(13)	92	90	1	94	98	2	31.0	93.2	8.0	24.4	.....	51.2	6.4	(13)	
(14)	92	86	91	96	70	2	18.8	82.8	12.2	21.8	10.3	53.8	1.9	(14)	
(15)	99	86	112	102	43	2	15.5	91.7	8.2	18.0	9.8	62.8	1.2	(15)	
(16)	82	69	81	87	44	3	8.6	73.8	12.2	12.4	11.6	61.1	2.7	(16)	
(17)	64	50	13	76	74	1	2.8	59.0	14.2	5.7	13.7	62.1	4.3	(17)	
(18)	54	63	55	53	13	1	6.6	49.4	9.4	10.5	36.3	42.0	1.8	(18)	
(19)	54	44	35	66	27	2	4.5	46.5	16.5	10.2	19.6	48.6	5.1	(19)	
(20)	88	44	39	90	63	1	1.6	82.1	7.4	3.6	3.4	84.8	0.8	(20)	
(21)	72	17	52	79	66	6	1.0	69.0	5.3	6.1	9.2	78.7	0.7	(21)	
(22)	84	52	77	90	68	8	7.9	80.5	3.9	15.2	10.5	68.5	1.9	(22)	
(23)	95	76	108	97	73	16	7.3	87.1	9.8	9.6	8.4	71.1	1.1	(23)	
(24)	97	97	..	111	55	1	86.8	95.7	2.7	89.5	.....	6.5	1.3	(24)	
(25)	85	-2	53	90	51	6	..	80.5	4.8	3.9	4.9	85.4	1.0	(25)	
(26)	88	-79	32	92	110	2	-1.3	86.7	2.2	1.6	2.5	93.1	0.6	(26)	
(27)	45	36	28	60	29	4	1.9	42.5	5.3	5.3	40.9	47.3	1.2	(27)	
(28)	69	81	-3	71	97	2	26.9	64.1	10.9	33.2	14.7	35.5	5.7	(28)	
(29)	48	-20	14	62	63	2	-1.3	50.7	1.6	6.5	17.3	70.4	4.2	(29)	
(30)	33	78	59	88	88	2	17.6	85.5	3.2	22.6	9.4	60.0	4.3	(30)	
(31)	96	73	85	95	51	4	3.8	89.4	4.3	5.2	4.6	85.3	0.6	(31)	
(32)	61	62	56	64	43	209	8.9	57.2	7.4	14.3	32.1	43.9	2.3	(32)	
(33)	59	56	48	68	32	13	6.5	55.2	6.8	11.6	34.4	45.1	2.1	(33)	
(34)	57	56	56	58	29	4	7.8	53.4	6.6	13.9	34.5	42.5	2.5	(34)	
(35)	56	59	45	64	52	2	6.7	54.2	7.1	11.3	34.1	44.2	3.3	(35)	
(36)	64	64	62	66	41	1	8.1	59.6	8.1	12.6	33.4	44.0	1.9	(36)	
(37)	65	65	53	72	58	2	12.2	61.4	9.2	18.8	23.8	45.1	3.1	(37)	
(38)	71	65	73	73	33	2	8.2	66.9	7.0	12.6	31.2	46.1	3.1	(38)	
(39)	71	63	72	77	13	1	8.7	66.4	8.0	13.8	30.6	45.5	2.1	(39)	
(40)	65	65	66	66	45	9	8.8	61.3	7.3	13.6	31.8	45.1	2.2	(40)	
(41)	62	67	74	55	12	1	11.1	57.7	8.0	16.6	29.9	43.3	2.2	(41)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Clover hay, full bloom, dried on riders . . . . .	83.3	6.1	54.6	8.0	4.9	10.2	27.2	39.1	1.9	( 1 )
( 2 )	—hay, weathered . . . . .	93.4	8.7	48.4	4.5	9.4	14.3	31.6	36.8	1.3	( 2 )
( 3 )	—hay, 2d cutting . . . . .	88.4	8.7	48.8	4.6	7.0	14.0	26.9	37.9	2.6	( 3 )
( 4 )	—hay, 2d cutting, early bloom . . . . .	84.9	7.6	44.0	4.8	5.9	12.7	28.4	36.3	1.6	( 4 )
( 5 )	—hay, 2d cutting, late bloom . . . . .	84.9	9.9	48.9	3.9	7.2	15.7	21.0	37.4	3.6	( 5 )
( 6 )	—hay, 2d cutting, air dried . . . . .	88.0	10.6	49.3	3.7	7.5	16.2	23.2	37.8	3.3	( 6 )
( 7 )	—hay, 2d cutting, late bloom, air dried . . . . .	85.4	11.7	48.9	3.2	7.3	17.4	19.7	37.2	3.8	( 7 )
( 8 )	—meal . . . . .	83.8	6.1	43.5	6.1	7.4	11.6	21.5	42.1	1.2	( 8 )
( 9 )	—fed green, all expts . . . . .	18.6	2.0	11.7	4.8	1.6	3.0	5.1	8.0	0.9	( 9 )
(10)	—late bloom, fed green . . . . .	22.6	2.2	13.9	5.2	1.9	3.6	6.1	9.7	1.3	(10)
(11)	—mature, fed green . . . . .	22.8	1.5	13.8	8.4	1.6	2.7	7.4	9.7	1.4	(11)
(12)	—2d cutting, fed green . . . . .	25.6	2.7	15.2	4.7	2.2	4.3	6.7	11.1	1.3	(12)
(13)	—silage, all expts . . . . .	20.0	1.8	11.0	5.1	1.9	3.1	6.1	8.1	0.8	(13)
(14)	—silage, all expts . . . . .	19.8	2.7	11.9	3.5	2.8	3.7	4.6	7.9	0.8	(14)
(15)	—silage, early bloom . . . . .	20.5	2.0	11.8	4.8	2.0	3.4	5.9	8.4	0.8	(15)
(16)	—silage, full bloom . . . . .	17.2	1.8	10.4	4.9	1.6	2.6	5.3	7.1	0.6	(16)
(17)	—seed screenings . . . . .	87.5	23.4	65.7	1.8	9.6	28.9	11.9	30.1	7.0	(17)
(18)	Clover hay, alsike . . . . .	84.4	8.3	47.6	4.7	7.3	12.4	25.2	36.9	2.6	(18)
(19)	—hay, early bloom . . . . .	80.8	8.3	43.8	4.3	7.8	12.6	28.4	35.2	1.8	(19)
(20)	—hay, full bloom . . . . .	90.2	8.4	55.4	5.6	6.9	12.5	28.0	39.1	3.7	(20)
(21)	—hay, late bloom . . . . .	82.3	8.1	44.1	4.5	6.9	12.0	24.3	36.7	2.4	(21)
(22)	—silage, late bloom . . . . .	21.2	1.0	10.7	9.4	2.2	2.6	7.9	7.7	0.8	(22)
(23)	—seed . . . . .	91.5	23.5	75.7	2.2	5.4	31.4	12.0	37.9	5.8	(23)
(24)	Clover hay, crimson . . . . .	86.4	9.9	44.7	3.5	8.0	14.8	29.8	31.9	1.9	(24)
(25)	—hay (Goats) . . . . .	88.8	10.7	48.9	3.6	7.1	15.6	26.0	38.1	2.0	(25)
(26)	—hay, early bloom . . . . .	84.9	14.6	53.1	2.6	14.2	20.0	19.5	28.8	2.4	(26)
(27)	—hay, late bloom . . . . .	86.1	9.3	42.1	3.5	7.2	14.1	31.3	31.7	1.8	(27)
(28)	—hay, air dried . . . . .	80.4	10.7	42.6	3.0	7.3	15.5	25.9	29.8	1.9	(28)
(29)	—late bloom, fed green . . . . .	15.9	2.2	10.5	3.9	1.5	2.8	4.3	6.6	0.7	(29)
(30)	Clover, Egyptian, fed green, all expts . . . . .	14.8	2.2	11.6	3.2	2.5	2.9	3.3	5.5	0.6	(30)
(31)	—1st cutting, fed green . . . . .	12.3	1.8	8.0	3.3	2.4	2.3	2.6	4.5	0.5	(31)
(32)	—1st cutting, prebloom, fed green . . . . .	11.8	1.7	7.6	3.3	2.4	2.2	2.6	4.2	0.4	(32)
(33)	—2d cutting, fed green . . . . .	10.2	1.7	6.6	3.0	1.7	2.1	2.1	3.8	0.5	(33)
(34)	—2d cutting, prebloom, fed green . . . . .	8.6	1.5	5.6	2.6	1.6	1.9	1.8	2.9	0.4	(34)
(35)	—3d or later cutting, fed green . . . . .	16.6	2.5	10.2	3.2	2.7	3.2	3.8	6.3	0.6	(35)
(36)	—3d or later cutting, prebloom, fed green . . . . .	18.2	2.0	7.7	2.8	2.7	2.6	2.8	4.6	0.5	(36)
(37)	—3d or later cutting, early bloom, fed green . . . . .	17.2	2.9	12.2	3.3	1.9	3.4	4.2	7.1	0.6	(37)
(38)	Clover hay, red . . . . .	85.1	8.2	49.5	5.0	6.6	13.5	25.4	37.2	2.4	(38)
(39)	—hay, prebloom . . . . .	83.7	9.5	55.6	4.8	8.7	15.4	16.4	40.7	2.5	(39)
(40)	—hay, early bloom . . . . .	88.6	8.0	49.0	5.1	9.2	12.9	23.1	41.3	2.1	(40)
(41)	—hay, full bloom . . . . .	86.3	9.5	54.1	4.7	7.4	14.6	19.8	41.8	2.7	(41)
(42)	—hay, postbloom . . . . .	84.5	4.4	42.2	8.7	5.7	9.9	24.7	42.3	1.9	(42)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%						%	
( 1 )	68	59	82	63	40	1	7.3	65.6	5.9	12.3	32.6	46.9	2.3	( 1 )	
( 2 )	57	61	57	58	10	1	9.3	51.8	10.1	15.3	33.8	39.4	1.4	( 2 )	
( 3 )	58	62	55	60	45	6	9.8	55.2	7.9	15.8	30.4	43.0	2.9	( 3 )	
( 4 )	55	60	68	45	2	1	9.0	51.8	7.0	15.0	33.4	42.7	1.9	( 4 )	
( 5 )	59	63	49	64	59	2	11.7	57.6	8.5	18.5	24.7	44.1	4.2	( 5 )	
( 6 )	72	65	48	62	57	3	12.0	56.0	8.5	18.4	26.4	43.0	3.7	( 6 )	
( 7 )	59	67	46	62	60	2	13.7	57.3	8.5	20.4	23.1	43.6	4.4	( 7 )	
( 8 )	56	53	34	69	36	1	7.3	51.9	8.3	13.8	25.7	50.3	1.4	( 8 )	
( 9 )	64	67	52	71	67	7	10.9	63.0	8.7	16.3	27.5	42.4	5.1	( 9 )	
(10)	62	62	44	71	72	1	9.9	61.6	8.6	15.9	26.9	42.7	5.9	(10)	
(11)	59	54	44	69	74	2	6.4	60.4	7.0	11.9	32.4	42.4	6.3	(11)	
(12)	61	62	53	65	61	2	10.4	59.4	8.6	16.8	26.2	43.3	5.1	(12)	
(13)	59	58	54	62	50	22	8.9	54.9	9.7	15.4	30.7	40.3	3.9	(13)	
(14)	66	71	63	65	69	16	13.4	60.1	14.1	18.9	23.2	39.8	4.0	(14)	
(15)	61	60	52	66	61	6	9.8	57.5	9.6	16.4	29.0	40.9	4.1	(15)	
(16)	65	67	59	70	45	2	10.3	60.7	9.2	15.4	30.9	41.2	3.3	(16)	
(17)	76	81	54	80	75	2	26.7	75.1	11.0	33.0	13.6	34.4	8.0	(17)	
(18)	60	67	50	66	40	9	9.8	56.4	8.6	14.7	29.8	43.8	3.1	(18)	
(19)	59	66	52	63	28	3	10.3	54.2	9.7	15.6	28.9	43.6	2.2	(19)	
(20)	63	67	54	70	55	3	9.3	61.4	7.7	13.9	31.0	43.3	4.1	(20)	
(21)	57	67	44	64	35	3	9.3	53.6	8.4	14.6	29.5	44.6	2.9	(21)	
(22)	53	40	55	56	54	2	4.8	50.4	10.4	12.1	37.2	36.4	3.9	(22)	
(23)	32	75	86	86	85	3	25.7	82.7	5.9	34.3	13.1	47.4	5.3	(23)	
(24)	56	67	45	61	47	11	11.5	51.7	9.3	17.1	34.5	36.9	2.2	(24)	
(25)	59	68	44	66	39	2	12.0	55.1	8.0	17.6	29.3	42.8	2.3	(25)	
(26)	73	73	69	78	49	2	17.2	62.6	16.7	23.6	23.0	33.9	2.8	(26)	
(27)	52	66	40	58	46	8	10.8	48.9	8.4	16.4	36.4	36.7	2.1	(27)	
(28)	57	69	46	62	35	3	13.3	53.0	9.1	19.3	32.2	37.0	2.4	(28)	
(29)	69	77	56	74	66	3	13.6	65.0	9.4	17.6	27.0	41.6	4.4	(29)	
(30)	73	77	60	79	58	88	14.9	63.2	16.6	19.4	22.2	38.0	3.8	(30)	
(31)	77	79	71	82	59	7	14.9	64.8	19.7	18.9	21.4	36.3	3.7	(31)	
(32)	78	79	72	82	61	6	14.8	64.3	20.6	18.8	22.0	35.0	3.6	(32)	
(33)	74	78	60	81	62	8	16.2	65.0	16.9	20.8	20.9	36.7	4.7	(33)	
(34)	75	80	60	82	63	6	17.9	64.6	18.4	22.4	21.2	33.4	4.6	(34)	
(35)	71	77	57	77	57	43	14.9	61.7	16.2	19.3	22.7	38.4	3.4	(35)	
(36)	70	76	57	75	56	12	15.2	58.0	20.1	20.0	21.5	34.9	3.5	(36)	
(37)	76	84	55	86	66	6	16.6	70.9	10.8	19.8	24.2	41.8	3.4	(37)	
(38)	61	61	52	67	59	28	9.7	58.2	7.8	15.9	29.9	43.6	2.8	(38)	
(39)	72	62	57	82	59	1	11.4	66.4	10.4	18.4	19.6	48.6	3.0	(39)	
(40)	60	62	49	67	42	3	9.0	55.3	10.4	14.6	26.1	46.5	2.4	(40)	
(41)	65	65	52	72	70	1	11.0	62.7	8.6	16.9	22.9	48.5	3.1	(41)	
(42)	53	44	40	64	23	1	5.2	50.0	6.8	11.7	29.2	50.1	2.2	(42)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Clover hay, red, 1st cutting.	87.1	8.3	51.5	5.2	7.4	12.9	26.9	37.9	2.0	(1)
(2)	—hay, 1st cutting, early bloom.....	88.6	10.1	51.7	4.1	9.9	15.8	25.1	36.0	1.8	(2)
(3)	—hay, 1st cutting, full bloom.....	84.9	10.1	51.3	4.1	7.5	13.5	25.5	36.2	2.2	(3)
(4)	—hay, 2d or 3d cutting..	86.1	11.1	49.3	3.4	8.3	16.5	24.4	34.9	2.0	(4)
(5)	—hay, 2d cutting, pre-bloom.....	84.6	12.2	49.2	3.0	7.8	16.9	23.3	34.7	1.9	(5)
(6)	—hay, 2d cutting, early bloom.....	88.1	8.1	49.0	5.0	7.9	13.5	26.3	38.7	1.7	(6)
(7)	—hay, 3d cutting, pre-bloom.....	82.6	12.4	44.2	2.6	10.2	18.0	20.8	31.8	1.8	(7)
(8)	—hay, air dried.....	84.9	12.2	46.1	2.8	9.2	18.8	26.2	28.4	2.3	(8)
(9)	—hay, 1st cutting, air dried.....	87.6	7.8	50.7	5.5	7.0	11.8	30.1	36.2	2.5	(9)
(10)	—hay, 1st cutting, dried on riders.....	86.3	7.2	54.3	6.5	6.2	11.0	26.7	39.7	2.7	(10)
(11)	—hay, 1st cutting, full bloom, dried on riders	84.8	8.8	49.7	4.7	7.2	13.3	26.8	35.3	2.2	(11)
(12)	—hay, 2d or 3d cutting, dried on riders.....	84.2	11.5	46.2	3.0	8.4	17.4	24.1	32.2	2.1	(12)
(13)	—hay, under 25% fiber..	85.4	11.0	50.0	3.5	8.4	16.0	23.7	35.0	2.3	(13)
(14)	—hay, 25-28% fiber....	86.0	9.0	50.1	4.6	7.2	14.1	26.3	36.2	2.2	(14)
(15)	—hay, 28-31% fiber....	87.5	7.9	50.7	5.4	6.8	11.9	29.4	36.9	2.5	(15)
(16)	—hay, over 31% fiber....	88.2	7.3	52.0	6.1	6.7	11.5	31.9	36.0	2.1	(16)
(17)	—hay, 9% protein.....	86.2	6.2	56.6	8.1	5.5	9.6	25.7	42.6	2.8	(17)
(18)	—hay, 11% protein....	87.4	7.6	51.0	5.7	6.6	11.9	29.5	37.0	2.4	(18)
(19)	—hay, 13% protein.....	86.3	9.8	49.6	4.0	8.0	14.9	25.2	36.1	2.1	(19)
(20)	—hay, 17% protein.....	84.7	14.1	59.5	3.2	9.0	18.4	24.5	30.7	2.1	(20)
(21)	Clover silage, red.....	18.9	2.2	10.4	3.6	2.0	3.3	5.7	7.3	0.6	(21)
(22)	—silage, early bloom....	15.6	2.1	7.9	2.7	2.0	3.1	4.9	5.0	0.6	(22)
(23)	—silage, full bloom.....	14.9	1.8	9.3	4.1	1.4	2.5	4.2	6.3	0.5	(23)
(24)	—silage, high ash.....	15.8	1.9	7.2	2.8	4.8	3.0	3.1	4.3	0.6	(24)
(25)	—silage, 1st cutting.....	24.2	2.3	13.8	5.1	2.0	3.7	7.0	10.6	0.9	(25)
(26)	—silage, 2d cutting.....	16.3	2.5	9.6	2.8	1.8	3.5	4.1	6.1	0.8	(26)
(27)	—silage, molasses or sugar added.....	18.1	2.6	11.2	3.4	2.1	3.6	4.1	7.6	0.7	(27)
(28)	—silage, $PCl_5$ added....	22.0	2.8	13.8	3.9	2.5	4.0	5.1	9.6	0.8	(28)
(29)	—silage, $SO_2$ added....	22.0	2.9	14.0	3.7	2.5	4.0	5.2	9.4	0.9	(29)
(30)	Clover hay, white, late bloom	87.6	11.0	56.0	4.1	7.4	15.2	24.9	36.4	3.7	(30)
(31)	Clover grass mixed hay...	85.0	5.3	49.1	8.4	5.9	9.2	27.8	40.2	1.9	(31)
(32)	—mixed, immature, dried	90.9	14.6	66.4	3.5	8.5	19.0	19.4	39.4	4.6	(32)
(33)	—mixed hay, early bloom	84.5	4.2	48.3	10.4	5.7	7.9	27.5	41.9	1.5	(33)
(34)	—mixed hay, full bloom..	87.0	5.0	48.8	8.6	6.2	8.8	28.6	41.1	2.3	(34)
(35)	—mixed hay, 2d cutting	87.0	6.4	52.0	7.1	7.1	11.2	25.2	40.8	2.7	(35)
(36)	—mixed hay, 2d cutting, early bloom.....	85.5	5.3	51.6	8.8	6.9	9.9	24.8	41.2	2.7	(36)
(37)	—mixed hay, dehydrated (87.0)	87.0	5.8	56.4	8.7	7.5	9.0	20.8	47.6	2.1	(37)
(38)	—mixed fodder, fed green	22.0	3.1	14.9	3.9	2.4	4.1	4.8	9.8	0.9	(38)
(39)	—mixed fodder, pasture or immature, fed green..	22.7	3.3	15.2	3.6	2.5	4.4	4.7	10.1	1.0	(39)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
( 1 )	64	64	56	70	36	6	% 9.5	% 59.1	% 8.5	% 14.8	% 30.9	% 43.5	% 2.3	( 1 )	
( 2 )	64	64	60	68	52	2	11.4	58.4	11.2	17.8	28.3	40.7	2.0	( 2 )	
( 3 )	66	75	61	68	20	1	11.9	60.4	8.8	15.9	30.0	42.7	2.6	( 3 )	
( 4 )	62	67	56	66	34	7	12.9	57.3	9.6	19.2	28.3	40.6	2.3	( 4 )	
( 5 )	64	72	61	65	7	2	14.4	58.2	9.2	20.0	27.5	41.1	2.2	( 5 )	
( 6 )	60	60	46	69	55	2	9.2	55.6	9.0	15.3	29.8	44.0	1.9	( 6 )	
( 7 )	61	69	69	54	7	2	15.0	53.5	12.4	21.8	25.2	38.4	2.2	( 7 )	
( 8 )	60	65	61	59	21	3	14.4	54.3	10.8	22.2	30.9	33.4	2.7	( 8 )	
( 9 )	63	66	54	72	12	3	8.9	57.9	8.0	13.5	34.4	41.2	2.9	( 9 )	
(10)	67	66	63	72	26	9	8.4	62.9	7.2	12.7	30.9	46.1	3.1	(10)	
(11)	64	66	60	68	16	2	10.4	58.6	8.5	15.7	31.6	41.6	2.6	(11)	
(12)	61	66	61	60	16	5	13.7	54.9	10.0	20.7	28.6	38.2	2.5	(12)	
(13)	64	69	63	65	27	11	12.9	58.6	9.9	18.7	27.7	41.0	2.7	(13)	
(14)	63	64	57	68	31	16	10.5	58.3	8.4	16.4	30.6	42.0	2.6	(14)	
(15)	62	66	54	71	13	4	9.0	57.9	7.8	13.6	33.6	42.1	2.9	(15)	
(16)	64	64	59	71	7	2	8.3	59.0	7.6	13.0	36.2	40.8	2.4	(16)	
(17)	69	65	64	74	38	6	7.2	65.7	6.4	11.1	29.8	49.4	3.3	(17)	
(18)	63	64	56	71	13	8	8.7	58.4	7.6	13.6	33.8	42.3	2.7	(18)	
(19)	62	66	55	67	37	9	11.4	57.5	9.3	17.3	29.2	41.8	2.4	(19)	
(20)	62	77	76	76	72	10	16.7	70.3	10.6	21.7	28.9	36.3	2.5	(20)	
(21)	58	67	55	58	57	5	11.8	54.8	10.7	17.6	30.1	38.3	3.3	(21)	
(22)	55	68	46	55	62	3	13.7	50.9	12.7	20.1	31.4	32.1	3.7	(22)	
(23)	67	72	72	62	51	1	12.1	62.3	9.6	16.8	28.0	42.2	3.4	(23)	
(24)	58	62	45	69	70	2	11.8	45.3	30.4	19.0	19.6	27.3	3.7	(24)	
(25)	61	62	49	70	34	3	9.4	57.2	8.2	15.1	28.9	44.1	3.7	(25)	
(26)	63	72	52	67	49	1	15.4	59.0	11.2	21.4	25.4	36.8	5.2	(26)	
(27)	66	72	68	61	74	2	14.2	62.0	11.6	19.7	22.9	41.7	4.1	(27)	
(28)	67	70	68	64	72	4	12.8	62.5	11.4	18.3	23.4	43.1	3.8	(28)	
(29)	68	73	70	64	71	4	13.4	63.7	11.3	18.4	23.8	42.5	4.0	(29)	
(30)	67	73	61	70	51	1	12.6	63.9	8.5	17.3	28.4	41.6	4.2	(30)	
(31)	61	57	61	62	47	63	6.2	57.8	6.9	10.8	32.7	47.4	2.2	(31)	
(32)	77	77	74	81	52	2	16.1	73.0	9.3	20.9	21.3	43.4	5.1	(32)	
(33)	61	54	58	63	50	9	5.0	57.2	6.7	9.3	32.6	49.6	1.8	(33)	
(34)	59	57	58	60	48	21	5.8	56.1	7.1	10.1	32.9	47.2	2.7	(34)	
(35)	63	57	64	65	48	6	7.4	59.7	8.2	12.9	29.0	46.8	3.1	(35)	
(36)	63	53	61	67	61	3	6.2	60.4	8.1	11.6	29.0	48.2	3.1	(36)	
(37)	69	64	70	70	57	2	6.7	64.8	8.6	10.4	23.9	54.7	2.4	(37)	
(38)	73	74	74	74	52	131	13.9	67.7	11.0	18.8	21.6	44.3	4.3	(38)	
(39)	24	75	74	72	52	90	14.6	67.0	11.0	19.5	20.0	44.4	4.3	(39)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Clover grass mixed fodder, prebloom, fed green...	20.4	2.6	14.1	4.4	2.5	3.7	4.2	9.2	0.8	(1)
(2)	—mixed silage, all expts.	24.2	1.7	14.4	7.2	2.4	3.2	7.4	10.3	0.9	(2)
(3)	—mixed silage, all expts..	17.2	2.3	12.5	4.5	1.9	3.1	5.3	5.6	1.3	(3)
(4)	—mixed silage, early bloom.....	23.0	1.6	13.3	7.5	1.8	2.9	7.8	9.7	0.8	(4)
(5)	—mixed silage, stack.....	26.9	1.7	16.7	8.6	2.5	3.2	8.0	12.2	1.0	(5)
(6)	—mixed silage, early bloom, stack.....	23.2	1.5	14.2	8.4	2.7	2.8	6.8	9.9	1.0	(6)
(7)	—mixed silage, low fiber.	24.1	1.9	14.5	6.8	3.0	3.3	6.4	10.4	1.0	(7)
(8)	—mixed silage, high fiber	24.5	1.7	14.2	7.5	2.1	3.1	8.3	10.1	0.9	(8)
(9)	—mixed silage, low protein	26.3	1.7	16.2	8.8	2.2	3.0	8.4	11.7	1.0	(9)
(10)	—mixed silage, high protein.....	22.1	1.9	12.5	5.7	2.6	3.3	6.5	8.8	0.9	(10)
(11)	—mixed silage, A. I. V..	18.7	2.7	14.4	4.4	1.8	3.5	5.5	6.4	1.5	(11)
(12)	—mixed silage, HCl and H <sub>3</sub> PO <sub>4</sub> added.....	18.6	2.0	11.2	4.5	1.9	3.1	5.5	7.4	0.7	(12)
(13)	—mixed silage, H <sub>2</sub> SO <sub>4</sub> added.....	17.2	2.1	10.6	3.9	1.8	3.1	5.0	6.6	0.7	(13)
(14)	—mixed silage, sugar added.....	17.6	1.9	10.2	4.4	1.8	3.0	5.5	6.6	0.7	(14)
(15)	Clover grass timothy weeds mixed hay.....	83.6	4.3	49.2	10.6	5.0	7.9	28.9	40.0	1.8	(15)
(16)	—mixed hay, prebloom...	83.7	5.9	54.4	8.3	5.9	9.5	27.3	38.8	2.2	(16)
(17)	—mixed hay, early bloom	83.6	4.1	48.5	10.9	4.6	7.5	30.4	39.5	1.6	(17)
(18)	—mixed hay, half bloom.	85.0	6.0	50.7	7.4	6.3	9.6	26.2	40.2	2.7	(18)
(19)	—mixed hay, late bloom.	82.9	2.8	45.8	15.2	4.0	6.1	30.7	40.7	1.4	(19)
(20)	—mixed hay, postbloom..	85.0	4.3	50.0	10.5	5.4	7.7	26.8	42.5	2.6	(20)
(21)	Clover redtop timothy mixed hay.....	89.1	3.9	50.8	12.1	5.8	7.8	29.5	44.1	1.9	(21)
(22)	Clover ryegrass mixed hay.	86.1	8.2	52.2	5.4	9.6	12.7	25.1	36.7	2.0	(22)
(23)	—mixed hay, postbloom.	83.8	4.9	42.2	7.6	8.4	9.8	29.8	34.6	1.2	(23)
(24)	—mixed silage, early bloom, stack.....	31.8	0.5	15.2	28.8	2.9	4.2	10.2	13.5	1.0	(24)
(25)	Clover timothy mixed hay, all expts.....	86.5	6.4	52.4	7.2	6.3	10.3	27.0	41.0	1.9	(25)
(26)	—mixed hay, prebloom...	82.1	7.2	54.3	6.5	5.2	10.5	27.1	37.1	2.2	(26)
(27)	—mixed hay, postbloom..	85.0	4.4	46.6	9.6	5.6	8.0	33.0	36.4	2.0	(27)
(28)	Clover heavy timothy mixed hay.....	84.4	2.4	48.3	18.9	4.2	5.4	28.4	44.3	2.1	(28)
(29)	—mixed hay, late bloom.	84.0	2.5	46.0	17.3	3.6	5.5	30.0	42.9	2.0	(29)
(30)	Clover timothy mixed hay, under 28% fiber	86.3	6.6	53.3	7.1	6.5	10.6	25.3	41.8	2.1	(30)
(31)	—mixed hay, over 28% fiber.....	86.1	6.5	50.6	6.8	6.3	10.4	30.8	36.9	1.7	(31)
(32)	—mixed hay, under 8% protein.....	84.8	3.1	50.7	15.2	4.7	6.3	28.3	43.5	2.0	(32)
(33)	—mixed hay, 10% protein.....	86.7	7.9	53.6	5.8	7.0	12.0	26.1	39.7	1.9	(33)
(34)	Clover timothy weeds mixed hay.....	83.8	6.2	51.7	7.4	5.4	9.8	27.4	39.3	1.9	(34)
(35)	—mixed hay, prebloom...	83.5	6.8	50.7	6.4	5.7	10.7	28.1	37.1	1.9	(35)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%	%	
( 1 )	77	72	81	79	42	12	12.9	69.2	12.1	17.9	20.8	45.3	3.9	( 1 )	
( 2 )	63	55	66	63	59	36	7.2	59.3	9.9	13.1	30.7	42.4	3.9	( 2 )	
( 3 )	74	73	67	80	76	14	13.1	72.7	11.0	18.0	30.7	32.9	7.4	( 3 )	
( 4 )	60	55	65	59	54	12	6.8	58.0	8.0	12.4	33.7	42.3	3.6	( 4 )	
( 5 )	66	55	66	68	61	14	6.5	62.0	9.4	11.8	29.7	45.5	3.6	( 5 )	
( 6 )	66	54	73	65	55	5	6.5	61.0	11.5	12.0	29.4	43.0	4.1	( 6 )	
( 7 )	65	57	67	67	61	16	7.8	60.3	12.3	13.6	26.6	43.4	4.1	( 7 )	
( 8 )	61	54	64	60	57	20	6.9	58.1	8.4	12.7	34.0	41.2	3.7	( 8 )	
( 9 )	64	55	66	65	61	19	6.3	61.6	8.2	11.4	31.8	44.8	3.8	( 9 )	
(10)	61	56	65	60	57	17	8.4	56.4	11.9	15.0	29.5	39.7	3.9	(10)	
(11)	77	77	70	83	78	9	14.3	77.2	9.8	18.6	29.3	34.5	7.8	(11)	
(12)	64	66	69	63	44	1	11.0	60.3	10.2	16.7	29.4	39.7	4.0	(12)	
(13)	66	69	50	75	63	1	12.4	61.4	10.7	18.0	29.0	38.2	4.1	(13)	
(14)	62	63	67	57	54	3	10.7	57.8	10.5	17.0	31.0	37.3	4.2	(14)	
(15)	61	54	57	66	50	43	5.1	58.8	6.0	9.4	34.6	47.8	2.2	(15)	
(16)	68	61	69	70	53	19	7.0	65.0	7.1	11.4	32.6	46.3	2.6	(16)	
(17)	60	54	55	66	45	16	4.9	58.0	5.5	9.0	36.4	47.2	1.9	(17)	
(18)	62	63	57	65	58	8	7.1	59.6	7.4	11.3	30.8	47.3	3.2	(18)	
(19)	57	46	50	64	50	24	3.4	55.2	4.8	7.4	37.0	49.1	1.7	(19)	
(20)	61	56	54	66	55	2	5.1	58.8	6.4	9.1	31.5	50.0	3.0	(20)	
(21)	60	50	65	59	40	3	4.4	57.0	6.5	8.7	33.1	49.6	2.1	(21)	
(22)	67	64	72	67	32	4	9.5	60.6	11.2	14.8	29.2	42.5	2.3	(22)	
(23)	56	50	61	53	28	1	5.8	50.3	10.0	11.7	35.6	41.3	1.4	(23)	
(24)	49	12	54	56	70	2	1.6	47.8	9.1	13.3	32.1	42.2	3.3	(24)	
(25)	64	62	61	67	49	31	7.4	60.6	7.3	11.9	31.2	47.4	2.2	(25)	
(26)	69	69	72	68	45	2	8.8	66.1	6.3	12.8	33.0	45.2	2.7	(26)	
(27)	57	55	54	60	56	1	5.2	54.8	6.6	9.4	38.8	42.9	2.3	(27)	
(28)	61	45	56	62	52	3	2.9	57.2	5.0	6.4	33.6	52.5	2.5	(28)	
(29)	56	46	54	59	44	1	3.0	54.8	4.3	6.5	35.7	51.1	2.4	(29)	
(30)	66	62	63	68	51	13	7.6	61.8	7.5	12.3	29.3	48.5	2.4	(30)	
(31)	62	62	61	64	45	4	7.5	58.8	7.3	12.1	35.8	42.8	2.0	(31)	
(32)	63	50	59	65	57	4	3.7	59.8	5.6	7.4	33.4	51.2	2.4	(32)	
(33)	66	66	64	68	47	13	9.1	61.8	8.1	13.8	30.1	45.8	2.2	(33)	
(34)	64	63	64	66	49	9	7.4	61.7	6.5	11.7	32.7	46.8	2.3	(34)	
(35)	64	64	63	65	46	8	8.2	60.7	6.8	12.8	33.6	44.5	2.3	(35)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Clover timothy weeds mixed hay, half bloom.....	85.0	3.7	55.8	14.4	4.4	6.5	25.0	47.0	2.1	( 1 )
( 2 )	Clover, crimson, ryegrass vetch mixed hay....	88.6	13.6	60.3	3.5	9.0	17.8	22.0	36.5	3.3	( 2 )
( 3 )	—mixed hay, prebloom, dehydrated.....	89.7	9.7	54.6	4.6	12.8	14.1	26.1	34.4	2.3	( 3 )
( 4 )	—mixed hay, early bloom, dehydrated.....	89.2	8.7	65.7	6.5	8.4	13.0	22.1	43.0	2.7	( 4 )
( 5 )	—mixed fodder, fed green	16.7	2.2	8.4	2.8	3.0	3.1	4.9	5.0	0.7	( 5 )
( 6 )	—mixed silage.....	15.0	2.2	10.9	3.9	1.6	2.7	4.9	4.8	1.0	( 6 )
( 7 )	Clover, crimson, vetch mixed silage, $\text{Ca}(\text{CHO}_2)_2$ and $\text{NaNO}_2$ added.....	13.0	2.8	8.0	1.9	1.9	3.4	2.7	4.8	0.2	( 7 )
( 8 )	—mixed silage, $\text{H}_2\text{SO}_4$ added.....	10.9	2.4	5.5	1.3	2.1	3.0	3.0	2.4	0.4	( 8 )
( 9 )	Clover, red, ryegrass mixed hay.....	84.7	6.8	49.4	6.2	5.7	11.2	26.4	39.9	1.5	( 9 )
(10)	Clover, red, heavy grass mixed hay, full bloom..	89.2	4.0	50.3	11.6	7.5	7.8	28.5	43.3	2.1	(10)
(11)	Clover, red, grass mixed fodder, postbloom, fed green.....	19.7	1.9	13.7	6.2	1.7	2.8	5.1	9.7	0.4	(11)
(12)	Clover, red, oat vetch mixed silage, $\text{HCONH}_2 \cdot \text{NaNO}_2$ added.....	18.6	3.0	11.1	2.8	2.2	4.0	5.2	6.4	0.8	(12)
(13)	Clover, red, ryegrass mixed silage, $\text{Ca}(\text{CHO}_2)_2$ and $\text{NaNO}_2$ added..	17.0	2.4	8.7	2.6	5.2	3.1	2.9	4.9	0.9	(13)
(14)	Clover, red, ryegrass timothy mixed silage, mature.....	30.9	1.1	18.3	15.8	2.8	3.4	10.4	13.6	0.7	(14)
(15)	Clover, red, timothy mixed hay, all expts.....	88.7	8.2	54.5	5.7	7.7	12.5	24.8	41.8	1.9	(15)
(16)	—mixed hay, early bloom	89.5	8.9	57.4	5.5	7.9	13.2	22.9	43.5	2.0	(16)
(17)	—mixed hay, 2d cutting..	92.4	7.9	53.6	5.8	7.9	13.1	29.7	39.9	1.8	(17)
(18)	—mixed hay, 2d cutting, early bloom.....	91.6	10.5	54.8	4.2	8.8	15.7	28.1	37.0	2.0	(18)
(19)	—mixed hay, dried on riders.....	86.9	8.2	54.9	5.7	7.9	12.1	23.0	41.9	2.0	(19)
(20)	—mixed hay, early bloom, dried on riders.....	95.1	8.6	66.1	6.7	7.6	12.6	22.3	50.1	2.5	(20)
(21)	—mixed silage, early bloom, 1st cutting..	24.0	2.0	15.0	6.7	2.9	3.0	5.2	12.3	0.6	(21)
(22)	Clover, white, grass mixed, immature, dehydrated and sun-cured..	92.6	12.0	68.8	4.7	10.9	16.7	19.5	41.2	4.3	(22)
(23)	—mixed pasture or fed green.....	24.0	3.7	17.7	3.8	2.7	4.7	5.0	10.7	0.9	(23)
(24)	—mixed pasture or immature, fed green....	24.0	3.8	17.6	3.7	2.8	4.8	4.6	10.8	1.0	(24)
(25)	—mixed fodder, prebloom, fed green.....	24.0	5.2	18.9	2.6	2.8	6.2	4.1	9.8	1.1	(25)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%	%	%	%	%	%		
( 1 )	67	56	66	70	60	1	4.3	65.7	5.2	7.6	29.4	55.3	2.5	( 1 )	
( 2 )	73	76	59	78	73	6	15.3	68.1	10.2	20.1	24.8	41.2	3.7	( 2 )	
( 3 )	69	69	62	74	64	3	10.8	60.9	14.3	15.7	29.1	38.3	2.6	( 3 )	
( 4 )	73	67	73	85	72	3	9.8	73.7	9.4	14.6	24.8	48.2	3.0	( 4 )	
( 5 )	61	72	40	61	69	4	13.4	50.0	18.1	18.6	29.1	29.9	4.3	( 5 )	
( 6 )	73	81	67	74	86	10	14.7	72.5	11.0	18.1	32.4	32.1	6.4	( 6 )	
( 7 )	71	82	64	69	44	4	21.5	61.6	14.8	26.2	20.8	36.6	1.6	( 7 )	
( 8 )	58	80	60	23	74	3	22.2	50.1	19.6	27.8	27.5	21.2	3.9	( 8 )	
( 9 )	62	61	56	65	53	20	8.0	58.3	6.7	13.2	31.2	47.1	1.8	( 9 )	
(10)	60	51	60	62	50	6	4.5	56.4	8.4	8.8	32.0	48.4	2.4	(10)	
(11)	74	69	68	78	77	1	9.7	69.7	8.4	14.1	26.1	49.2	2.2	(11)	
(12)	64	74	57	58	80	2	15.9	59.7	11.8	21.5	28.2	34.1	4.4	(12)	
(13)	67	78	62	61	72	2	14.4	51.2	30.3	18.4	17.0	29.0	5.3	(13)	
(14)	63	32	74	62	67	2	3.5	59.2	9.2	11.0	33.8	43.6	2.4	(14)	
(15)	66	65	62	69	50	16	9.2	61.4	8.7	14.1	28.0	47.1	2.1	(15)	
(16)	69	67	64	72	56	6	9.9	64.1	8.8	14.8	25.6	48.6	2.2	(16)	
(17)	62	60	57	67	50	4	8.5	58.0	8.5	14.2	32.1	43.2	2.0	(17)	
(18)	65	67	61	67	51	2	11.5	59.8	9.6	17.1	30.7	40.4	2.2	(18)	
(19)	68	68	64	71	50	5	9.4	63.2	9.1	13.9	26.5	48.2	2.3	(19)	
(20)	73	68	66	78	67	3	9.0	69.5	8.0	13.3	23.4	52.7	2.6	(20)	
(21)	71	66	61	74	59	1	8.3	62.6	12.2	12.6	21.6	51.2	2.4	(21)	
(22)	80	72	83	81	75	14	13.0	74.3	11.8	18.0	21.1	44.5	4.6	(22)	
(23)	80	79	81	82	57	13	15.4	73.9	11.1	19.5	20.7	44.8	3.9	(23)	
(24)	80	78	80	82	59	7	15.7	73.4	11.6	20.1	19.1	45.1	4.1	(24)	
(25)	86	85	89	87	58	2	21.8	78.7	11.7	25.7	17.2	40.8	4.6	(25)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Clover, white, grass mixed fodder, early bloom, fed green.....	24.0	3.9	18.6	3.7	2.6	4.8	4.9	10.7	1.0	( 1 )
( 2 )	—mixed fodder, post-bloom, fed green....	24.0	1.7	16.5	8.7	2.3	2.4	7.4	11.4	0.5	( 2 )
( 3 )	Cocoa shells.....	92.1	4.1	48.9	10.8	7.4	15.3	17.9	46.7	4.8	( 3 )
( 4 )	Coconut oil meal, steamed...	90.8	16.6	84.0	4.0	6.4	19.8	12.4	39.5	12.7	( 4 )
( 5 )	Coffee residue, (Chicory and coffee grains), dry....	92.8	0.1	30.4	233.2	5.5	13.2	36.2	31.3	6.6	( 5 )
( 6 )	Conifer cone meal.....	79.8	0.8	39.4	46.1	2.7	8.4	34.1	26.9	7.7	( 6 )
( 7 )	—needle meal, fir.....	86.8	4.5	33.8	6.4	3.0	8.8	35.6	33.0	6.4	( 7 )
( 8 )	—needle meal, fir, extracted	79.9	-5.2	20.2	.....	2.1	8.6	37.3	27.0	4.9	( 8 )
( 9 )	—needles, pine, fresh.....	94.6	-0.8	30.0	40.8	10.3	5.3	39.3	28.9	10.8	( 9 )
(10)	—needles, pine, alcohol extracted, collected from ground.....	94.6	-1.7	8.9	.....	8.5	5.0	42.4	38.5	0.2	(10)
(11)	—needles, pine, alcohol extracted, collected from tree, dried.....	95.3	-0.6	33.7	.....	2.1	9.0	45.0	36.8	2.4	(11)
(12)	Cordgrass hay.....	81.6	2.4	40.5	16.1	5.9	5.5	29.4	39.1	1.7	(12)
(13)	Corn cobs, ground.....	93.2	-0.7	45.9	.....	1.9	2.9	34.3	53.7	0.4	(13)
(14)	—cobs, ground.....	90.3	-0.1	46.7	.....	1.6	3.2	31.0	53.9	0.6	(14)
(15)	—fodder, dry.....	79.3	4.3	49.4	10.6	6.5	8.0	22.8	40.1	1.9	(15)
(16)	—fodder, dehydrated....	88.7	3.3	53.7	15.2	4.3	7.4	20.0	54.4	2.6	(16)
(17)	—fodder, prebloom, dehydrated.....	89.2	2.7	56.0	19.9	3.7	6.2	17.2	59.1	2.9	(17)
(18)	—fodder, late bloom, dried	87.5	4.8	54.1	10.2	7.8	8.8	24.7	44.4	1.8	(18)
(19)	—fodder, milk stage, dried	91.8	1.7	49.2	28.8	9.5	4.6	29.8	46.3	1.6	(19)
(20)	—fodder, dough stage, dried.....	73.6	4.3	47.3	9.9	5.2	8.0	20.9	37.5	2.0	(20)
(21)	—fodder, mature, dried....	54.0	4.5	37.1	7.1	4.2	7.1	15.6	25.9	1.2	(21)
(22)	—fodder, under 10% moisture.....	92.4	3.0	49.3	16.0	10.0	6.9	30.4	43.6	1.5	(22)
(23)	—fodder, 10-20% moisture	85.2	4.8	54.4	10.3	5.7	9.0	20.2	47.5	2.8	(23)
(24)	—fodder, 30-40% moisture	66.8	5.5	47.8	7.6	4.1	8.1	20.4	32.9	1.3	(24)
(25)	—fodder, over 40% moisture.....	53.5	3.5	34.2	8.7	3.8	6.1	16.5	25.9	1.2	(25)
(26)	—fodder, large, immature, dried.....	74.2	4.6	48.2	9.4	4.6	6.9	20.3	41.3	1.1	(26)
(27)	—fodder, large, immature, partly dried.....	54.0	4.0	33.7	7.4	3.9	6.6	17.3	24.9	1.3	(27)
(28)	—fodder, large, dough stage, dried.....	58.5	4.1	38.1	8.3	4.2	7.1	18.7	27.0	1.5	(28)
(29)	—fodder, large, late bloom, partly dried.....	49.5	3.8	29.7	6.8	3.6	6.0	15.9	23.0	1.0	( 9 )
(30)	—fodder, sweet, mature, partly dried.....	54.9	4.8	36.6	6.7	3.2	7.4	15.9	26.8	1.6	(30)
(31)	—husks, dry.....	92.2	0.4	54.6	139.9	3.5	3.2	30.3	54.6	0.6	(31)
(32)	—leaves, dry.....	89.3	4.0	53.0	12.1	7.4	9.4	21.9	46.2	4.4	(32)
(33)	—leaves, dry (Goats)....	89.3	6.6	44.0	5.6	7.2	9.6	22.9	45.7	3.9	(33)
(34)	—stover, dry.....	82.0	1.6	44.8	26.0	6.3	5.3	27.4	41.4	1.6	(34)
(35)	—stover, mature, dry.....	77.5	3.4	47.8	13.0	5.3	6.4	26.5	38.3	1.0	(35)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%						%	
( 1 )	84	82	86	86	54	2	16.3	77.4	10.8	19.9	20.6	44.6	4.1	( 1 )	
( 2 )	74	70	73	77	54	2	7.1	68.6	9.5	10.1	31.0	47.5	1.9	( 2 )	
( 3 )	51	27	26	65	90	8	4.5	53.1	8.0	16.6	19.4	50.8	5.2	( 3 )	
( 4 )	82	84	42	85	100	10	18.3	92.5	7.0	21.8	13.7	43.5	14.0	( 4 )	
( 5 )	30	1	38	14	82	2	0.1	32.8	5.9	14.2	39.0	33.8	7.1	( 5 )	
( 6 )	45	10	51	50	45	1	1.0	49.4	3.4	10.5	42.7	33.8	9.6	( 6 )	
( 7 )	36	52	36	29	48	2	5.2	39.0	3.5	10.1	41.0	38.0	7.4	( 7 )	
( 8 )	31	-6	43	25	24	2	-6.5	25.3	2.6	10.8	46.7	33.8	6.1	( 8 )	
( 9 )	24	-15	25	18	65	1	-0.8	31.7	10.9	5.6	41.5	30.6	11.4	( 9 )	
(10)	8	-34	3	24	-98	1	-1.8	8.9	9.0	5.3	44.8	40.7	0.2	(10)	
(11)	36	-6	33	50	18	1	-0.6	35.4	2.2	9.4	47.2	38.7	2.5	(11)	
(12)	52	43	57	50	47	12	2.9	49.6	7.2	6.7	36.0	48.0	2.1	(12)	
(13)	52	-26	51	57	-170	2	-0.8	49.3	2.0	3.1	36.8	57.7	0.4	(13)	
(14)	53	-3	59	52	34	9	-0.1	51.7	1.8	3.5	34.3	59.7	0.7	(14)	
(15)	66	53	68	67	65	20	5.4	62.3	8.2	10.1	28.8	50.5	2.4	(15)	
(16)	62	45	50	67	67	3	3.7	60.5	4.9	8.3	22.6	61.3	2.9	(16)	
(17)	63	43	42	70	73	2	3.0	62.8	4.2	7.0	19.3	66.3	3.2	(17)	
(18)	67	55	69	67	60	6	5.5	61.8	8.9	10.0	23.2	50.8	2.1	(18)	
(19)	58	36	57	61	66	3	1.8	53.6	10.4	5.0	32.5	50.4	1.7	(19)	
(20)	67	54	67	69	67	9	5.9	64.3	7.0	10.9	28.4	50.8	2.9	(20)	
(21)	72	64	80	70	72	2	8.4	68.7	7.8	13.2	28.9	47.9	2.2	(21)	
(22)	59	42	62	59	56	6	3.2	53.4	10.8	7.5	32.9	47.2	1.6	(22)	
(23)	66	53	61	69	71	11	5.6	63.8	6.7	10.6	23.7	55.7	3.3	(23)	
(24)	74	68	79	74	65	2	8.3	71.6	6.2	12.2	30.6	49.0	2.0	(24)	
(25)	67	58	72	66	65	8	6.6	63.9	7.2	11.4	30.8	48.4	2.2	(25)	
(26)	68	67	60	72	66	3	6.2	64.9	6.2	9.3	27.4	55.6	1.5	(26)	
(27)	65	61	70	63	64	4	7.4	62.4	7.2	12.2	32.0	46.2	2.4	(27)	
(28)	67	58	75	65	69	2	7.0	65.1	7.1	12.1	32.0	46.2	2.6	(28)	
(29)	63	63	66	61	60	2	7.7	60.0	7.3	12.2	32.1	46.3	2.1	(29)	
(30)	68	65	72	66	72	4	8.7	66.7	5.8	13.4	29.0	48.8	3.0	(30)	
(31)	62	12	69	60	39	3	0.4	59.2	3.8	3.5	32.9	59.1	0.7	(31)	
(32)	60	43	67	61	61	1	4.5	59.3	8.3	10.5	24.5	51.8	4.9	(32)	
(33)	59	69	54	57	65	1	7.4	49.3	8.1	10.8	25.6	51.1	4.4	(33)	
(34)	57	31	62	58	60	15	2.0	54.6	7.7	6.5	33.4	50.4	2.0	(34)	
(35)	65	53	72	64	36	2	4.4	61.7	6.8	8.3	34.2	49.4	1.3	(35)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Corn stover, pith removed, chopped, dry.....	87.8	0.9	50.3	54.1	4.6	4.6	28.5	47.4	2.7	( 1 )
( 2 )	—fodder, fed green, all expts.....	24.2	1.3	16.7	11.9	1.3	2.2	5.7	14.3	0.7	( 2 )
( 3 )	—fodder, full bloom, fed green.....	24.1	1.5	15.3	9.2	1.3	2.3	6.8	12.7	1.0	( 3 )
( 4 )	—fodder, late bloom, fed green.....	19.0	1.4	12.7	7.8	1.2	2.2	5.1	9.9	0.6	( 4 )
( 5 )	—fodder, milk stage, fed green.....	23.9	1.1	16.4	13.2	1.1	2.0	5.2	15.0	0.6	( 5 )
( 6 )	—fodder, dough stage, fed green.....	28.1	1.2	19.8	16.2	1.3	2.2	5.9	18.0	0.7	( 6 )
( 7 )	—fodder, mature, fed green.....	49.0	1.9	35.3	17.4	1.4	3.6	8.3	34.1	1.6	( 7 )
( 8 )	—fodder, low fiber, fed green.....	27.3	1.3	19.3	14.0	1.2	2.3	5.7	17.4	0.7	( 8 )
( 9 )	—fodder, high fiber, fed green.....	19.5	1.2	13.1	9.5	1.2	2.0	5.4	10.2	0.7	( 9 )
(10)	—fodder, close-planted, fed green.....	18.2	1.4	13.3	8.6	1.1	2.1	4.7	9.5	0.8	(10)
(11)	—fodder, close-planted, late bloom, fed green.....	13.8	1.5	10.1	5.7	1.0	2.0	3.6	6.5	0.7	(11)
(12)	—fodder, close-planted, milk stage, fed green.....	22.7	1.1	16.8	14.4	1.0	1.8	5.7	13.4	0.8	(12)
(13)	—fodder, wide-planted, late bloom, fed green.....	20.1	0.7	13.7	19.0	0.8	1.2	5.7	11.9	0.5	(13)
(14)	—fodder, large, immature, fed green.....	14.9	1.1	10.0	8.4	1.3	1.6	4.6	7.0	0.4	(14)
(15)	—fodder, sweet, fed green.....	18.8	1.2	13.3	10.1	1.2	1.9	4.0	11.1	0.6	(15)
(16)	—fodder, sweet, milk stage fed green.....	20.2	1.1	14.3	11.9	1.2	1.8	4.1	12.5	0.6	(16)
(17)	—fodder, sweet, mature, fed green.....	13.5	1.5	10.0	5.8	1.1	1.9	3.3	6.8	0.4	(17)
(18)	—silage, all expts.....	21.5	0.9	13.6	14.3	1.5	1.9	5.8	11.6	0.7	(18)
(19)	—silage, all expts.....	18.3	0.8	12.7	15.2	1.3	1.5	4.5	10.4	0.6	(19)
(20)	—silage, milk stage.....	18.2	0.9	12.7	13.8	1.5	1.5	5.3	9.4	0.5	(20)
(21)	—silage, dough stage.....	22.2	1.1	15.5	12.7	1.5	2.0	5.7	12.2	0.8	(21)
(22)	—silage, mature.....	30.5	1.3	21.0	15.1	2.3	2.4	8.6	15.9	1.3	(22)
(23)	—silage, overripe.....	32.4	0.9	22.9	23.7	2.4	2.2	9.2	16.6	2.0	(23)
(24)	—silage, close-planted....	(21.0)	0.4	11.4	30.3	1.7	1.4	5.3	12.0	0.5	(24)
(25)	—silage, large, late bloom.....	13.5	1.1	8.5	6.7	1.1	1.7	4.0	6.3	0.4	(25)
(26)	—silage, large, immature.....	21.1	1.2	13.2	9.8	1.6	2.2	6.6	10.1	0.6	(26)
(27)	—silage, biosil added.....	16.2	0.7	11.1	15.3	1.2	1.4	4.0	9.1	0.5	(27)
(28)	—silage, sugar added.....	21.0	0.9	14.9	15.9	1.2	1.6	4.2	13.3	0.7	(28)
(29)	—silage, flint, dough stage.....	18.6	1.0	13.1	12.0	1.3	1.8	4.9	10.0	0.6	(29)
(30)	—silage, sweet.....	16.5	1.1	12.0	10.3	0.9	2.0	4.1	8.5	1.0	(30)
(31)	—stover silage.....	35.1	1.0	18.6	17.6	3.0	2.6	11.8	16.9	0.8	(31)
(32)	—stover silage, stack.....	35.0	0.4	18.8	50.6	2.4	2.4	9.9	19.3	1.0	(32)
(33)	—grain.....	86.0	7.5	84.5	10.2	1.6	9.6	2.2	68.0	4.6	(33)
(34)	—grain (Goats).....	87.3	5.9	77.9	12.2	1.3	8.8	1.6	71.2	4.4	(34)
(35)	—grain.....	86.4	6.7	80.5	10.9	1.5	9.7	1.7	69.7	3.8	(35)
(36)	—grain (Goats).....	87.3	86.2	15.6	0	1.3	8.8	1.6	71.2	4.4	(36)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%							
( 1 )	57	20	63	57	72	3	1.0	57.3	5.2	5.2	32.5	54.0	3.1	( 1 )	
( 2 )	71	59	63	74	76	60	5.4	69.1	5.2	9.1	23.4	59.3	3.0	( 2 )	
( 3 )	65	65	67	58	81	5	6.2	63.4	5.5	9.6	28.3	52.3	4.3	( 3 )	
( 4 )	69	64	67	70	68	3	7.6	66.8	6.1	11.8	26.9	52.1	3.1	( 4 )	
( 5 )	72	57	58	75	75	13	4.8	68.8	4.5	8.5	21.9	62.5	2.6	( 5 )	
( 6 )	71	53	59	77	77	7	4.1	70.3	4.6	7.7	21.1	64.0	2.6	( 6 )	
( 7 )	71	53	52	77	78	4	3.9	72.0	2.8	7.4	16.9	69.7	3.2	( 7 )	
( 8 )	72	57	59	77	76	26	4.7	70.7	4.4	8.3	20.8	63.8	2.7	( 8 )	
( 9 )	69	62	68	69	75	17	6.4	67.1	6.4	10.3	27.6	52.2	3.5	( 9 )	
(10)	74	67	69	76	81	4	7.6	73.3	6.0	11.4	25.6	52.6	4.4	(10)	
(11)	74	74	71	75	79	2	11.0	73.5	7.4	14.8	25.8	46.9	5.1	(11)	
(12)	73	60	66	78	82	2	4.8	73.9	4.6	8.0	25.3	58.4	3.7	(12)	
(13)	69	56	61	74	72	2	3.4	68.3	3.9	6.1	28.5	59.2	2.3	(13)	
(14)	71	65	74	70	71	2	7.2	67.3	8.6	11.0	30.7	46.8	2.9	(14)	
(15)	73	64	64	77	75	16	6.4	71.0	6.3	10.0	21.5	59.0	3.2	(15)	
(16)	72	62	60	77	75	12	5.5	70.6	5.9	8.8	20.3	61.8	3.2	(16)	
(17)	78	78	75	80	74	2	10.9	74.4	8.4	14.0	24.7	49.8	3.1	(17)	
(18)	66	47	64	68	71	56	4.1	63.3	7.1	8.8	27.1	53.7	3.3	(18)	
(19)	70	53	65	76	82	21	4.3	69.4	7.2	8.1	24.4	57.1	3.2	(19)	
(20)	73	59	69	76	85	2	4.7	69.8	8.2	8.0	29.0	51.8	3.0	(20)	
(21)	72	56	71	73	78	7	5.1	69.7	6.6	9.1	25.8	55.0	3.5	(21)	
(22)	70	55	59	76	82	1	4.3	69.0	7.7	7.8	28.2	52.0	4.3	(22)	
(23)	69	42	65	73	87	2	2.9	70.6	7.5	6.8	28.4	51.2	6.1	(23)	
(24)	58	26	48	64	63	8	1.7	54.4	8.0	6.7	25.4	57.1	2.8	(24)	
(25)	66	65	67	65	68	1	8.1	62.7	8.2	12.5	29.8	46.7	2.8	(25)	
(26)	65	56	68	65	68	10	5.8	62.6	7.5	10.4	31.4	47.9	2.8	(26)	
(27)	67	50	65	76	82	8	4.2	68.6	7.6	8.4	24.7	56.3	3.0	(27)	
(28)	71	54	58	77	91	4	4.2	71.0	5.8	7.3	19.9	63.3	3.2	(28)	
(29)	72	56	72	76	73	2	5.4	70.4	6.9	9.7	26.4	54.0	3.0	(29)	
(30)	70	54	71	72	83	2	6.4	72.8	5.3	11.9	24.6	52.1	6.1	(30)	
(31)	56	38	60	55	67	9	2.9	53.0	8.6	7.5	33.6	47.9	2.4	(31)	
(32)	55	15	50	61	74	1	1.0	53.6	7.0	6.9	28.3	54.8	3.0	(32)	
(33)	94	78	30	99	87	1	8.7	98.2	1.9	11.2	2.5	79.1	5.3	(33)	
(34)	91	67	-182	94	80	1	6.8	89.2	1.5	10.1	1.8	81.6	5.0	(34)	
(35)	89	70	93	93	85	29	7.8	93.2	1.7	11.2	2.0	80.7	4.4	(35)	
(36)	94	59	-41	101	98	2	6.0	98.7	1.5	10.1	1.8	81.6	5.0	(36)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Corn, grain, flint, Argentine	89.9	8.9	90.4	9.2	1.4	10.3	2.0	71.4	4.8	(1)
(2)	—grain, under 4% fat....	86.3	6.7	80.4	10.9	1.4	9.8	1.7	70.0	3.4	(2)
(3)	—grain, 4% fat.....	86.5	6.9	79.8	10.6	1.6	9.7	1.9	68.7	4.6	(3)
(4)	—grain, under 14% moisture.....	87.6	6.3	80.3	11.8	1.3	9.6	1.7	71.0	4.0	(4)
(5)	—grain, 14-15.5% moisture.....	85.4	7.7	80.6	9.5	1.7	10.1	1.9	68.7	3.0	(5)
(6)	—grain, 17.5-20% moisture.....	80.2	6.6	77.4	10.7	1.9	8.3	2.1	62.6	5.3	(6)
(7)	—grain, under 9% protein	84.8	5.7	77.6	12.7	1.4	8.7	1.9	68.3	4.5	(7)
(8)	—grain, 9% protein.....	86.8	7.1	81.0	10.4	1.6	10.0	1.7	69.9	3.6	(8)
(9)	—bran.....	88.2	4.8	66.1	12.8	2.2	8.4	9.3	62.9	5.4	(9)
(10)	—distillers' dried grains..	93.1	22.2	77.5	2.5	1.6	30.9	12.8	37.8	10.1	(10)
(11)	—distiller's dried grains with solubles.....	93.6	13.3	78.4	4.9	3.7	27.0	12.1	35.1	15.7	(11)
(12)	—germ meal.....	90.4	17.2	77.0	3.5	3.6	23.0	21.4	32.2	10.2	(12)
(13)	—germ meal, solvent process.....	90.6	10.5	76.7	6.3	4.3	14.0	10.3	61.6	0.4	(13)
(14)	—gluten feed, low ash, high fat.....	89.9	14.3	86.7	5.0	0.8	17.3	7.5	58.6	5.7	(14)
(15)	—gluten feed, low ash, very high fat.....	91.1	19.3	93.6	3.9	0.5	22.4	7.7	47.9	12.6	(15)
(16)	—gluten feed, low ash, 22% protein.....	90.2	19.1	79.8	3.2	1.8	23.4	6.7	55.1	3.2	(16)
(17)	—gluten feed, low ash, 24% protein.....	90.2	21.6	78.7	2.6	2.9	25.2	6.9	52.3	2.9	(17)
(18)	—gluten feed, 27% protein	88.7	24.9	71.0	1.8	4.7	29.7	5.3	46.9	2.1	(18)
(19)	—gluten feed, maltose process.....	89.7	20.1	86.9	3.3	0.7	23.4	8.2	49.3	8.1	(19)
(20)	—gluten meal, high fat....	90.0	28.6	89.3	2.1	0.5	32.1	1.3	49.1	7.0	(20)
(21)	—gluten meal, very high fat	91.6	32.5	105.6	2.2	1.4	35.4	1.3	35.5	13.0	(21)
(22)	—gluten meal, 41% protein	92.0	37.4	81.0	1.2	1.0	43.5	1.7	44.3	1.5	(22)
(23)	—oil meal.....	89.2	15.3	74.7	3.9	3.1	21.3	9.5	47.4	7.9	(23)
(24)	Corn and cob meal (Goats)	87.6	5.1	73.0	13.2	1.1	7.9	8.2	67.2	3.2	(24)
(25)	—meal.....	80.7	4.3	63.5	13.9	1.4	7.7	8.4	59.6	3.6	(25)
(26)	—meal (Goats).....	87.6	3.6	73.2	19.2	1.2	7.9	8.0	67.2	3.3	(26)
(27)	Corn ear chops, immature, fed green.....	27.5	2.6	23.8	8.2	0.8	3.4	4.2	18.1	1.0	(27)
(28)	—ear chops, milk stage, fed green.....	19.4	1.3	15.5	10.6	0.5	2.2	2.4	13.5	0.8	(28)
(29)	Corn curly leaf mallow mixed silage.....	17.2	1.4	10.9	6.5	1.9	2.2	4.1	8.4	0.6	(29)
(30)	Corn pea mixed silage.....	22.2	1.8	11.0	5.1	2.1	3.2	6.7	9.6	0.6	(30)
(31)	Corn light soybean mixed silage.....	20.2	1.4	16.6	10.5	1.2	2.1	5.1	9.6	2.2	(31)
(32)	Corn, flint, sunflower head horsebean mixed silage.....	20.2	1.7	13.2	6.7	1.7	2.7	5.0	10.1	0.7	(32)
(33)	Corn, flint, sunflower horsebean mixed silage.....	19.1	1.3	12.7	8.5	1.7	2.3	4.8	9.6	0.7	(33)
(34)	Corn vetch mixed fodder, dehydrated.....	90.5	7.4	50.7	5.8	8.1	13.3	30.0	37.1	2.0	(34)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	96	86	94	98	91	2	9.9	100.6	1.6	11.5	2.2	79.4	5.3	( 1 )	
( 2 )	89	69	120	93	85	18	7.8	93.2	1.6	11.3	2.0	81.2	3.9	( 2 )	
( 3 )	88	71	45	92	86	10	8.0	92.2	1.9	11.2	2.2	79.4	5.3	( 3 )	
( 4 )	88	65	84	92	81	17	7.2	91.7	1.5	11.0	1.9	81.0	4.6	( 4 )	
( 5 )	91	76	121	94	90	9	9.0	94.4	2.0	11.8	2.2	80.5	3.5	( 5 )	
( 6 )	91	80	53	93	96	2	8.2	96.5	2.4	10.3	2.6	78.1	6.6	( 6 )	
( 7 )	88	65	44	92	82	6	6.7	91.5	1.7	10.3	2.2	80.5	5.3	( 7 )	
( 8 )	90	71	107	93	86	22	8.2	93.3	1.8	11.5	2.0	80.5	4.2	( 8 )	
( 9 )	77	57	63	73	78	17	5.4	74.9	2.5	9.5	10.5	71.4	6.1	( 9 )	
(10)	73	72	64	72	88	8	23.9	83.2	1.7	33.2	13.7	40.7	10.7	(10)	
(11)	67	49	67	68	94	2	14.2	83.8	4.0	23.9	12.9	37.4	16.8	(11)	
(12)	75	75	68	72	96	3	19.0	85.2	4.0	25.4	23.7	35.6	11.3	(12)	
(13)	86	75	100	90	50	1	11.6	84.7	4.7	15.4	11.4	68.1	0.4	(13)	
(14)	87	83	78	90	80	2	15.9	96.4	0.9	19.2	8.3	65.3	6.3	(14)	
(15)	89	86	89	90	86	4	21.2	102.7	0.6	24.6	8.4	52.6	13.8	(15)	
(16)	87	82	86	91	65	7	21.2	88.5	2.0	25.9	7.4	61.1	3.6	(16)	
(17)	91	86	82	90	65	31	24.0	87.2	3.2	27.9	7.6	58.1	3.2	(17)	
(18)	83	84	76	84	56	6	28.1	80.1	5.3	33.5	6.0	52.8	2.4	(18)	
(19)	87	86	82	88	92	2	22.4	96.9	0.8	26.1	9.1	55.0	9.0	(19)	
(20)	91	89	2	94	92	4	31.8	99.2	0.6	35.7	1.4	54.5	7.8	(20)	
(21)	87	92	-60	97	97	2	35.5	115.3	1.5	38.6	1.4	38.8	19.7	(21)	
(22)	90	86	50	93	45	8	40.7	88.0	1.1	47.3	1.8	48.2	1.6	(22)	
(23)	80	72	82	78	82	7	17.2	83.7	3.5	23.9	10.7	53.0	8.9	(23)	
(24)	80	65	48	86	85	1	5.8	83.3	1.3	9.0	9.4	76.6	3.7	(24)	
(25)	75	55	52	81	81	9	5.3	78.7	1.7	9.6	10.4	73.8	4.5	(25)	
(26)	81	46	44	89	84	2	4.1	83.6	1.4	9.0	9.1	76.7	3.8	(26)	
(27)	86	76	88	87	78	1	9.4	86.5	2.8	12.4	15.3	65.9	3.6	(27)	
(28)	78	60	76	81	77	1	6.8	79.7	2.6	11.4	12.2	69.7	4.1	(28)	
(29)	68	66	53	75	72	4	8.4	63.3	10.8	12.8	23.3	49.4	3.2	(29)	
(30)	54	57	62	49	22	1	8.2	49.6	9.3	14.3	30.4	43.2	2.8	(30)	
(31)	73	68	65	77	90	2	7.1	82.0	5.8	10.5	25.3	47.7	10.7	(31)	
(32)	68	63	60	72	76	2	8.5	65.3	8.4	13.5	24.8	49.7	3.6	(32)	
(33)	69	58	65	74	74	2	7.0	66.6	8.7	12.1	25.3	50.4	3.5	(33)	
(34)	61	56	68	60	14	1	8.2	56.0	9.0	14.7	33.1	41.0	2.2	(34)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Corn vetch mixed silage...	21.1	1.3	12.1	8.5	1.9	2.4	7.0	9.2	0.6	(1)
(2)	Cotton.....	92.0	-1.5	64.3	.....	1.2	1.1	32.8	6.4	0.5	(2)
(3)	—burs, dry.....	92.4	2.8	41.2	14.0	8.6	10.5	32.6	38.7	2.0	(3)
(4)	Cottonseed hulls.....	92.2	0	45.1	.....	2.5	3.7	49.6	35.7	0.7	(4)
(5)	—hulls (Goats).....	84.4	.....	36.4	.....	2.2	4.4	38.1	36.4	3.3	(5)
(6)	—hulls.....	92.0	-0.5	52.1	.....	2.4	3.7	48.7	36.4	0.8	(6)
(7)	—hulls, delinted.....	91.8	0	48.3	.....	2.3	3.5	38.8	46.6	0.6	(7)
(8)	—hulls, with some meal...	86.3	3.4	36.8	9.7	2.4	8.4	32.8	41.1	1.6	(8)
(9)	—whole, high fiber.....	93.0	16.6	76.8	3.6	4.6	20.9	25.9	24.1	17.5	(9)
(10)	—kernel meal, hulls re-										
	moved.....	95.1	32.3	112.5	2.5	4.5	40.9	2.4	15.7	31.6	(10)
(11)	—whole, pressed.....	90.3	18.1	63.6	2.5	4.7	25.1	23.3	28.8	8.4	(11)
(12)	—feed, all expts.....	90.1	19.6	59.0	2.0	5.6	26.6	20.0	31.5	6.4	(12)
(13)	—feed, under 6% fat.....	89.5	15.8	54.6	2.4	4.5	22.0	21.2	37.7	4.1	(13)
(14)	—feed, 6% fat.....	90.1	20.4	59.0	1.9	6.0	27.2	20.1	29.5	7.3	(14)
(15)	—feed, 21% protein, under										
	18% fiber.....	89.8	23.2	64.8	1.8	6.0	30.1	15.6	30.6	7.5	(15)
(16)	—feed, 21% protein, under										
	24% fiber.....	90.9	18.4	62.3	2.4	4.6	24.6	21.4	34.1	6.2	(16)
(17)	—feed, 21% protein, over										
	24% fiber.....	89.7	16.1	48.1	2.0	6.0	23.0	25.6	30.3	4.8	(17)
(18)	—meal, all expts.....	91.8	22.2	63.1	1.8	5.8	36.4	13.9	27.8	7.9	(18)
(19)	—meal, under 10% fat....	92.8	34.2	73.1	1.1	6.1	42.2	12.1	25.1	7.3	(19)
(20)	—meal, 10% fat.....	93.2	36.2	81.5	1.2	5.7	43.7	7.5	24.6	11.7	(20)
(21)	—meal, 16% fat.....	92.7	37.4	87.0	1.3	7.5	43.9	3.8	20.9	16.6	(21)
(22)	—meal, 36% protein, high										
	fiber.....	93.5	33.7	81.2	1.4	5.1	39.6	15.7	26.5	6.6	(22)
(23)	—meal, 36% protein, high										
	fiber.....	92.9	30.0	69.5	1.3	6.9	36.6	18.6	23.5	7.3	(23)
(24)	—meal, 36% protein,										
	low fiber (Goats)....	93.0	35.9	81.6	1.3	5.8	39.3	6.5	29.6	11.8	(24)
(25)	—meal, 41% protein, off										
	quality, low fiber....	87.3	34.8	74.0	1.1	7.1	42.5	7.7	21.4	8.6	(25)
(26)	—meal, 41% protein, high										
	fiber.....	93.6	34.3	75.6	1.2	5.4	42.3	12.2	25.5	8.2	(26)
(27)	—meal, 43% protein, low										
	fiber.....	92.8	33.3	83.1	1.2	5.7	44.1	5.4	25.3	12.3	(27)
(28)	—meal, 43% protein, high										
	fiber.....	93.6	34.6	71.7	1.1	6.1	43.8	11.4	24.9	7.4	(28)
(29)	—meal, 45% protein, low										
	fiber.....	92.0	33.8	81.6	1.1	7.5	46.7	6.3	21.7	9.8	(29)
(30)	—meal, 45% protein, high										
	fiber.....	93.7	39.3	81.3	1.1	5.8	46.8	10.4	23.1	7.6	(30)
(31)	Cowpea hay.....	87.8	8.9	51.2	4.8	7.5	12.9	26.5	38.4	2.5	(31)
(32)	—hay (Goats).....	88.7	8.2	50.6	5.2	4.8	12.6	29.5	40.5	1.3	(32)
(33)	—hay, dough stage.....	87.8	7.7	53.7	6.0	7.1	11.3	25.9	41.1	2.4	(33)
(34)	—hay, late bloom.....	87.3	10.6	48.5	3.6	9.1	14.7	26.2	34.2	3.1	(34)
(35)	—fodder, fed green.....	14.6	1.6	9.8	5.1	1.9	2.2	3.6	6.2	0.7	(35)
(36)	—fodder, prebloom, fed										
	green.....	17.8	2.4	12.2	4.1	2.0	3.1	3.7	8.3	0.7	(36)
(37)	—fodder, early bloom, fed										
	green.....	13.4	1.3	9.0	5.9	1.7	1.8	3.5	5.7	0.7	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
(1)	62	53	64	64	37	1	6.0	57.4	9.2	11.4	33.2	43.4	2.8	(1)	
(2)	77	-132	91	-153	-29	3	-1.6	69.9	1.3	1.2	90.0	7.0	0.5	(2)	
(3)	48	26	39	59	64	4	3.0	44.6	9.3	11.4	35.3	41.8	2.2	(3)	
(4)	50	0	49	55	72	5	0	48.9	2.7	4.0	53.8	38.7	0.8	(4)	
(5)	40	-2	49	31	85	2	-0.1	42.9	2.6	5.2	45.1	43.2	3.9	(5)	
(6)	58	-12	57	64	79	10	-0.5	56.6	2.6	4.0	52.9	39.6	0.9	(6)	
(7)	53	0	46	63	76	1	0	52.6	2.5	3.8	42.3	50.7	0.7	(7)	
(8)	42	41	18	58	97	2	4.0	42.6	2.8	9.7	38.0	47.6	1.9	(8)	
(9)	64	79	33	63	93	2	17.8	82.6	5.0	22.5	27.8	25.9	18.8	(9)	
(10)	83	79	52	68	96	2	34.0	118.3	4.7	43.0	2.5	16.6	33.2	(10)	
(11)	62	72	35	64	100	12	20.0	70.4	5.2	27.8	25.8	31.9	9.3	(11)	
(12)	62	74	34	63	88	23	21.8	65.5	6.2	29.5	22.2	35.0	7.1	(12)	
(13)	62	72	39	61	81	6	17.7	61.0	5.0	24.6	23.7	42.1	4.6	(13)	
(14)	60	75	29	60	92	15	22.6	65.5	6.7	30.2	22.3	32.7	8.1	(14)	
(15)	67	77	26	72	92	10	25.8	72.2	6.7	33.5	17.4	34.0	8.4	(15)	
(16)	64	75	38	66	95	7	20.3	68.5	5.1	27.1	23.5	37.5	6.8	(16)	
(17)	53	70	40	46	73	6	17.9	53.6	6.7	25.6	28.5	33.9	5.3	(17)	
(18)	72	61	31	70	96	39	24.2	68.7	6.3	39.7	15.1	30.3	8.6	(18)	
(19)	76	31	41	73	95	18	36.9	78.8	6.6	45.5	13.0	27.0	7.9	(19)	
(20)	78	83	8	74	100	6	38.9	87.4	6.1	46.9	8.1	26.3	12.6	(20)	
(21)	80	85	-18	84	88	2	40.3	93.9	8.1	47.4	4.1	22.5	17.9	(21)	
(22)	82	85	62	87	99	2	36.0	86.8	5.5	42.4	16.8	28.2	7.1	(22)	
(23)	70	82	23	81	98	2	32.3	74.8	7.4	39.4	20.0	25.3	7.9	(23)	
(24)	80	91	41	63	92	2	38.5	87.7	6.2	42.3	7.0	31.8	12.7	(24)	
(25)	90	82	..	95	97	2	39.9	84.8	8.1	48.7	8.8	24.5	9.9	(25)	
(26)	73	81	60	58	104	4	36.6	80.8	5.8	45.2	13.0	27.2	8.8	(26)	
(27)	79	87	-19	70	101	4	41.3	89.5	6.1	47.5	5.8	27.3	13.3	(27)	
(28)	72	79	43	67	93	8	37.0	76.6	6.5	46.3	12.2	26.6	7.9	(28)	
(29)	95	83	..	96	100	1	42.2	88.7	8.2	50.8	6.8	23.6	10.6	(29)	
(30)	82	84	69	79	97	2	41.9	86.8	6.2	49.9	11.1	24.7	8.1	(30)	
(31)	62	69	47	71	46	5	10.1	58.3	8.5	14.7	30.2	43.8	2.8	(31)	
(32)	60	65	41	71	54	1	9.2	57.1	5.4	14.2	33.3	45.6	1.5	(32)	
(33)	65	68	44	76	64	2	8.8	61.2	8.1	12.9	29.5	46.8	2.7	(33)	
(34)	60	72	52	65	29	2	12.1	55.5	10.4	16.8	30.0	39.3	3.5	(34)	
(35)	73	74	58	82	60	31	11.0	66.9	12.7	14.9	25.0	42.6	4.8	(35)	
(36)	74	76	60	81	59	4	13.4	68.7	11.2	17.6	20.6	46.7	3.9	(36)	
(37)	73	72	58	84	59	10	9.7	67.2	13.0	13.5	26.3	42.0	5.2	(37)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Cowpea fodder, full bloom, fed green . . . . .	12.2	1.9	7.6	2.9	1.9	2.4	3.0	4.3	0.6	(1)
(2)	—fodder, dough stage, fed green . . . . .	16.2	1.7	9.9	4.7	2.0	2.3	5.0	6.3	0.6	(2)
(3)	Cowpea sorghum mixed silage . . . . .	31.6	0.5	17.3	31.2	1.9	2.2	8.5	18.3	0.7	(3)
(4)	Cowpeas, seed . . . . .	38.8	19.2	75.8	3.0	3.2	23.4	5.1	55.8	1.3	(4)
(5)	Crabgrass hay . . . . .	88.8	1.4	46.2	32.5	6.6	6.6	32.6	41.1	1.9	(5)
(6)	—hay, overripe . . . . .	89.2	2.2	46.0	20.0	7.3	6.9	33.2	40.2	1.6	(6)
(7)	Cutgrass, clubhead, prebloom, fed green . . . . .	(18.0)	0.8	10.8	12.2	0.9	1.9	4.9	10.0	0.3	(7)
(8)	Dallisgrass, early bloom, fed green . . . . .	(18.0)	0.6	12.1	19.3	0.8	1.2	6.2	9.5	0.3	(8)
(9)	Dandelion fodder, common, early bloom, dry . . . . .	88.6	10.6	59.0	4.6	12.0	14.7	15.0	42.7	4.2	(9)
(10)	Danthonia hay, poverty . . . . .	91.7	4.5	58.9	12.0	3.8	7.8	29.5	47.7	2.9	(10)
(11)	—hay, poverty, half bloom . . . . .	71.7	2.7	43.3	15.4	2.7	5.4	24.4	37.1	2.1	(11)
(12)	—hay, poverty, full bloom . . . . .	91.7	6.0	63.3	9.7	4.2	8.7	27.7	47.8	3.3	(12)
(13)	Deervetch, Spanishclover, fed green . . . . .	7.4	0.2	3.2	18.3	0.5	0.9	1.8	4.1	0.1	(13)
(14)	Distillers' dried grains . . . . .	90.5	18.5	72.5	2.9	8.9	26.8	11.5	33.4	9.9	(14)
(15)	Dogtoothgrass hay . . . . .	85.5	4.0	41.4	9.3	8.3	7.7	28.3	39.7	1.5	(15)
(16)	—hay, postbloom . . . . .	85.5	3.3	40.3	11.2	8.3	7.4	29.2	38.5	2.1	(16)
(17)	Dogtoothgrass, giant, fed green . . . . .	(20.0)	2.1	11.5	4.6	1.4	2.9	5.9	9.4	0.4	(17)
(18)	—prebloom, fed green . . . . .	(20.0)	3.1	12.8	3.2	1.6	4.0	4.8	9.0	0.6	(18)
(19)	—early bloom, fed green . . . . .	(20.0)	1.6	11.3	6.0	1.2	2.3	6.4	9.8	0.3	(19)
(20)	Dogtoothgrass, grass mixed fodder, postbloom, fed green . . . . .	(26.0)	1.3	13.6	9.4	2.9	2.2	8.1	12.0	0.8	(20)
(21)	—mixed silage, postbloom . . . . .	(30.0)	1.4	16.4	10.7	1.8	2.9	10.9	13.6	0.8	(21)
(22)	Dolichos hay, hyacinth . . . . .	90.2	8.3	50.5	5.1	7.4	12.8	33.6	34.7	1.7	(22)
(23)	—hay, postbloom . . . . .	90.2	6.1	49.0	7.0	8.0	10.6	34.0	35.6	2.0	(23)
(24)	Dreg meal . . . . .	94.5	30.6	81.1	1.7	1.6	47.1	4.9	26.9	14.0	(24)
(25)	Emmer, grain . . . . .	90.6	9.2	72.7	6.8	3.4	11.6	9.2	64.2	2.2	(25)
(26)	Falseflax seed oil meal . . . . .	89.8	26.0	70.4	1.7	11.3	31.2	11.0	30.2	6.1	(26)
(27)	Felicia fodder, roughleaf, dry . . . . .	(87.0)	7.1	40.4	4.6	8.4	10.9	23.5	41.0	3.2	(27)
(28)	Fescue hay, meadow . . . . .	84.8	4.1	49.2	11.2	7.9	7.6	26.7	40.6	2.0	(28)
(29)	—hay, meadow . . . . .	82.0	5.9	50.6	7.6	8.9	9.5	26.2	34.8	2.6	(29)
(30)	—hay, meadow, prebloom . . . . .	83.0	5.7	52.2	8.1	7.1	9.4	24.7	39.6	2.2	(30)
(31)	—hay, meadow, early bloom . . . . .	84.7	2.5	45.8	17.0	7.5	5.2	30.7	40.1	1.2	(31)
(32)	—hay, meadow, full bloom . . . . .	84.4	3.7	48.1	12.0	7.8	6.8	24.5	43.1	2.2	(32)
(33)	—hay, meadow, mature . . . . .	86.3	2.2	43.0	18.0	9.5	5.3	29.0	40.5	2.0	(33)
(34)	Fescue hay, Idaho, overripe . . . . .	87.4	0.3	42.1	113.7	10.1	3.3	30.9	40.8	2.3	(34)
(35)	Fescue hay, red . . . . .	85.4	4.1	49.7	11.0	7.3	7.9	26.2	42.1	1.9	(35)
(36)	—hay, early bloom . . . . .	85.4	4.0	46.7	10.7	8.8	7.3	27.8	39.8	1.7	(35)
(37)	Fescue grass mixed hay, mature . . . . .	85.5	4.1	49.1	11.0	7.0	8.4	25.7	42.7	1.7	(37)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	71	79	54	74	66	1	15.9	62.6	15.3	20.1	24.4	35.1	5.1	( 1 )	
( 2 )	71	76	45	81	60	1	10.6	61.0	12.4	14.0	30.8	39.4	3.4	( 2 )	
( 3 )	56	24	49	64	58	2	1.7	54.8	5.9	7.1	27.0	57.8	2.2	( 3 )	
( 4 )	87	82	63	92	69	6	21.6	85.4	3.6	26.3	5.7	62.9	1.5	( 4 )	
( 5 )	56	21	63	55	38	11	1.6	52.0	7.4	7.4	36.7	46.4	2.1	( 5 )	
( 6 )	55	32	64	53	36	2	2.5	51.6	8.2	7.7	37.2	45.1	1.8	( 6 )	
( 7 )	64	42	57	70	32	1	4.5	60.1	4.8	10.8	27.2	55.3	1.9	( 7 )	
( 8 )	69	48	72	71	51	4	3.3	67.3	4.4	6.9	34.2	52.9	1.6	( 8 )	
( 9 )	74	72	78	76	45	1	12.0	66.6	13.5	16.6	16.9	48.3	4.7	( 9 )	
(10)	65	58	68	65	50	2	4.9	64.2	4.2	8.5	32.2	51.9	3.2	(10)	
(11)	61	49	65	62	38	1	3.7	60.4	3.8	7.5	34.1	51.7	2.9	(11)	
(12)	69	68	71	69	63	1	6.5	69.0	4.6	9.5	30.2	52.1	3.6	(12)	
(13)	46	19	34	56	37	3	2.2	43.3	6.3	11.8	24.2	55.8	1.9	(13)	
(14)	74	69	70	75	94	13	20.4	80.1	9.8	29.6	12.7	37.0	10.9	(14)	
(15)	53	52	57	50	41	6	4.7	48.4	9.7	9.0	33.1	46.4	1.8	(15)	
(16)	50	45	54	48	57	2	3.9	47.1	9.7	8.6	34.2	45.0	2.5	(16)	
(17)	61	72	61	59	33	6	10.4	57.7	7.0	14.4	29.3	47.1	2.2	(17)	
(18)	67	76	66	66	45	2	15.4	63.9	7.9	20.2	24.0	44.9	3.0	(18)	
(19)	60	70	57	60	21	2	8.1	56.5	5.9	11.6	32.2	48.9	1.4	(19)	
(20)	56	60	56	56	56	2	5.0	52.2	11.1	8.4	31.0	46.5	3.0	(20)	
(21)	57	49	62	52	66	2	4.7	54.8	6.0	9.5	36.3	45.6	2.6	(21)	
(22)	60	65	53	64	56	4	9.2	56.0	8.2	14.2	37.2	38.5	1.9	(22)	
(23)	58	58	51	64	61	2	6.8	54.3	8.9	11.7	37.7	39.5	2.2	(23)	
(24)	69	65	23	70	97	2	32.4	85.8	1.7	49.8	5.2	28.5	14.8	(24)	
(25)	81	80	29	88	87	12	10.2	80.2	3.8	12.8	10.2	70.8	2.4	(25)	
(26)	80	83	35	91	96	2	28.9	78.4	12.6	34.8	12.3	33.5	6.8	(26)	
(27)	48	66	23	60	43	8	8.2	46.4	9.6	12.5	27.0	47.2	3.7	(27)	
(28)	63	53	63	64	52	22	4.8	58.0	9.3	9.0	31.5	47.8	2.4	(28)	
(29)	68	62	81	64	20	1	7.2	61.7	10.8	11.6	31.9	42.5	3.2	(29)	
(30)	67	61	66	70	50	6	6.9	62.9	8.6	11.3	29.8	47.7	2.6	(30)	
(31)	59	49	63	56	55	2	3.0	54.1	8.9	6.1	36.2	47.4	1.4	(31)	
(32)	60	54	54	64	73	3	4.4	57.0	9.2	8.1	29.0	51.1	2.6	(32)	
(33)	55	43	52	57	57	4	2.6	49.8	11.0	6.1	33.6	47.0	2.3	(33)	
(34)	63	11	61	51	41	2	0.4	48.2	11.6	3.8	35.4	46.6	2.6	(34)	
(35)	62	52	68	61	49	8	4.8	58.2	8.6	9.3	30.7	49.2	2.2	(35)	
(36)	60	55	64	58	48	4	4.7	54.7	10.3	8.5	32.5	46.7	2.0	(36)	
(37)	61	49	62	64	44	1	4.8	57.4	8.2	9.8	30.1	49.9	2.0	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Fescue orchardgrass mixed hay, mature.....	84.6	4.9	45.0	8.1	5.5	9.1	29.0	39.6	1.4	(1)
(2)	Fingergrass hay.....	93.4	5.0	54.8	9.8	6.7	9.1	32.2	43.5	1.9	(2)
(3)	Fingergrass, pentz, fed green.....	18.0	1.2	11.7	9.0	1.2	1.9	6.1	8.4	0.4	(3)
(4)	—prebloom, fed green.....	18.0	2.1	13.1	5.3	1.6	2.7	5.4	7.7	0.6	(4)
(5)	—early, bloom, fed green.....	18.0	0.9	11.7	11.4	1.2	1.7	6.0	8.7	0.4	(5)
(6)	—late bloom, fed green.....	20.0	0.7	11.7	14.8	0.9	1.5	7.6	9.5	0.5	(6)
(7)	Fish meal, all expts.....	82.7	49.0	60.9	0.2	20.6	55.1	.....	5.5	(7)	
(8)	—low ash.....	90.4	54.4	76.4	0.4	13.8	61.8	.....	9.6	(8)	
(9)	—medium ash.....	90.1	54.4	67.1	0.2	22.4	61.2	.....	6.1	(9)	
(10)	—high ash.....	87.4	50.0	55.3	0.1	28.4	55.5	.....	2.4	(10)	
(11)	—under 5% fat.....	85.8	51.2	55.9	0.1	26.3	56.9	.....	2.3	(11)	
(12)	—5-9% fat.....	80.2	45.7	58.7	0.3	19.3	52.5	.....	6.0	(12)	
(13)	—oily.....	90.2	55.3	79.4	0.4	15.1	62.1	.....	2.4	10.6	(13)
(14)	—50% protein.....	87.9	46.1	57.8	0.2	26.1	51.9	.....	5.4	(14)	
(15)	—55% protein.....	88.5	49.8	62.7	0.3	23.7	56.6	.....	5.7	(15)	
(16)	—60% protein.....	90.4	56.1	70.0	0.2	21.5	62.4	.....	6.4	(16)	
(17)	—65% protein.....	90.8	59.0	74.9	0.3	17.2	67.2	.....	7.9	(17)	
(18)	—cod, steam-dried.....	86.8	59.8	66.5	0.1	21.2	62.9	.....	3.6	(18)	
(19)	—Norwegian cod, air-dried.....	83.0	47.5	51.4	0.1	29.1	51.6	.....	1.8	(19)	
(20)	—herring.....	90.0	50.0	75.6	0.5	16.6	56.9	.....	11.7	(20)	
(21)	—herring, oily.....	90.0	59.7	80.7	0.4	15.3	64.9	.....	9.4	(21)	
(22)	—herring, low salt.....	91.6	57.5	77.3	0.3	16.1	65.4	.....	8.4	(22)	
(23)	—herring, high salt.....	90.4	49.4	62.0	0.3	25.0	56.0	.....	5.7	(23)	
(24)	—menhaden.....	91.6	41.2	58.3	0.4	15.5	50.8	.....	7.0	(24)	
(25)	—pilchard.....	91.8	49.5	60.8	0.2	23.3	60.3	.....	5.1	(25)	
(26)	—stickleback.....	93.9	54.6	61.9	0.1	28.4	62.1	.....	2.9	(26)	
(27)	—white.....	86.1	54.2	61.9	0.1	24.1	58.3	.....	3.8	(27)	
(28)	Fish residue meal.....	94.3	51.8	57.8	0.1	22.6	69.0	.....	2.6	(28)	
(29)	Fish press water, condensed.....	49.4	30.4	37.2	0.2	13.5	34.2	.....	3.8	(29)	
(30)	Flax hulls.....	91.1	0.8	35.3	41.1	9.5	4.2	30.1	45.9	1.4	(30)
(31)	—hulls.....	91.1	2.4	33.6	13.0	8.8	12.0	27.0	42.0	1.3	(31)
(32)	Flax plant by-product, dry.....	92.4	0.9	17.4	17.4	6.7	6.3	45.7	32.5	1.2	(32)
(33)	—plant by-product, dry.....	90.0	12.1	41.5	2.4	5.0	14.8	32.3	35.0	2.9	(33)
(34)	Flaxseed.....	92.6	18.7	97.5	4.2	6.1	22.3	5.9	24.2	34.1	(34)
(35)	—screenings, mostly flax dodder.....	88.9	7.3	56.0	6.7	5.6	13.0	14.0	47.9	8.4	(35)
(36)	Foxtail hay, meadow.....	88.8	9.2	56.4	5.1	9.0	13.8	23.9	40.5	1.6	(36)
(37)	—immature, dried.....	85.7	6.5	51.2	6.8	6.0	10.4	28.4	38.1	2.8	(37)
(38)	Fruit pit oil meal.....	86.9	18.9	45.3	1.4	11.7	22.7	24.0	26.7	1.8	(38)
(39)	Gamagrass hay, Florida.....	92.3	4.2	48.5	10.3	6.8	8.4	26.0	49.3	1.8	(39)
(40)	Gamagrass, Guatemala, 1st cutting, prebloom, fed green.....	27.0	0.8	17.4	21.2	2.2	1.4	9.4	13.2	0.8	(40)
(41)	—2d cutting, prebloom, fed green.....	30.5	0.7	18.1	24.6	2.4	1.3	10.2	15.8	0.8	(41)
(42)	Giantreed fodder, dry.....	81.9	2.2	25.5	10.4	7.5	6.2	30.7	36.4	1.1	(42)
(43)	Gooper, Congo.....	85.0	15.0	67.8	3.5	3.4	17.9	10.7	49.1	3.9	(43)
(44)	Goosegrass hay.....	92.1	.....	32.4	.....	9.1	3.2	33.0	45.8	1.0	(44)
(45)	Grape marc meal.....	89.2	1.6	27.5	15.7	14.3	10.3	26.0	31.5	7.1	(45)
(46)	—marc meal.....	91.8	1.4	20.4	14.2	12.1	12.3	27.4	34.6	5.4	(46)
(47)	—marc, fed fresh.....	35.7	0.8	11.5	13.1	2.8	5.1	6.5	19.8	1.5	(47)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

DIGESTION COEFFICIENTS							DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								
Row No.	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	Row No.	
							%	%	%	%	%	%	%		
(1)	56	54	60	54	41	1	5.8	53.2	6.5	10.8	34.3	46.8	1.6	(1)	
(2)	62	56	68	60	41	21	5.4	58.7	7.2	9.7	34.5	46.6	2.0	(2)	
(3)	68	62	72	67	53	6	6.5	65.0	6.6	10.5	33.9	46.5	2.5	(3)	
(4)	77	78	78	76	71	1	11.6	72.8	8.9	14.9	30.2	42.8	3.2	(4)	
(5)	68	57	73	69	34	1	5.2	64.8	6.6	9.2	33.6	48.6	2.0	(5)	
(6)	60	51	66	56	55	2	3.7	58.6	4.4	7.3	38.0	47.9	2.4	(6)	
(7)	86	89	..	..	95	44	59.3	73.6	24.9	66.6	..	..	6.7	(7)	
(8)	83	88	..	5	102	10	60.2	84.5	15.3	68.4	..	..	10.6	(8)	
(9)	87	89	..	..	92	22	60.4	74.5	24.9	67.9	..	..	6.8	(9)	
(10)	84	90	..	..	101	8	57.2	63.3	32.5	63.5	..	..	2.7	(10)	
(11)	85	90	..	..	92	16	59.7	65.2	30.7	66.3	..	..	2.7	(11)	
(12)	84	87	..	..	96	16	57.0	73.2	24.1	65.5	..	..	7.5	(12)	
(13)	89	89	..	15	99	10	61.3	88.0	16.7	68.9	..	2.6	11.8	(13)	
(14)	85	89	..	..	95	12	52.5	65.6	29.7	59.0	..	..	6.1	(14)	
(15)	84	88	..	..	101	4	56.3	70.9	26.8	64.0	..	..	6.4	(15)	
(16)	87	90	..	..	96	18	62.1	77.4	23.8	69.0	..	..	7.1	(16)	
(17)	85	88	..	..	89	8	65.1	82.5	19.0	74.0	..	..	8.7	(17)	
(18)	88	95	..	..	82	6	68.9	76.6	24.4	72.5	..	..	4.2	(18)	
(19)	85	92	..	..	96	4	57.2	61.9	35.1	62.2	..	..	2.2	(19)	
(20)	92	88	..	-21	97	4	55.6	84.0	18.4	63.2	..	..	13.0	(20)	
(21)	85	92	..	..	99	4	66.3	89.7	17.0	72.1	..	..	10.5	(21)	
(22)	88	88	..	58	104	4	62.8	84.4	17.6	71.4	..	..	9.2	(22)	
(23)	86	88	..	-30	99	4	54.6	68.6	27.6	62.0	..	..	6.3	(23)	
(24)	64	81	..	..	108	2	45.0	63.7	16.9	55.5	..	..	7.7	(24)	
(25)	75	82	..	..	99	2	53.9	66.2	25.4	65.7	..	..	5.6	(25)	
(26)	85	88	..	..	111	2	58.2	65.9	30.2	66.1	..	..	3.1	(26)	
(27)	87	93	..	..	90	12	63.0	71.9	28.0	67.7	..	..	4.4	(27)	
(28)	76	75	..	..	101	2	54.9	61.3	24.0	73.2	..	..	2.8	(28)	
(29)	93	89	..	..	80	4	61.6	75.4	27.3	69.3	..	..	7.7	(29)	
(30)	42	20	31	52	40	4	0.9	38.8	10.4	4.6	33.0	50.5	1.5	(30)	
(31)	40	20	31	52	36	4	2.6	36.9	9.7	13.2	29.6	46.1	1.4	(31)	
(32)	19	15	11	32	37	3	1.0	18.8	7.2	6.8	49.5	35.2	1.3	(32)	
(33)	45	81	26	43	93	2	13.4	46.1	5.6	16.5	35.9	38.8	3.2	(33)	
(34)	70	84	30	42	87	2	20.2	105.3	6.6	24.1	6.4	26.1	36.8	(34)	
(35)	58	56	13	70	71	21	8.2	63.0	6.3	14.6	15.8	53.9	9.4	(35)	
(36)	70	67	71	71	39	1	10.4	63.5	10.1	15.5	26.9	45.7	1.8	(36)	
(37)	62	63	63	63	44	1	7.6	59.8	7.0	12.1	33.1	44.5	3.3	(37)	
(38)	58	83	14	73	89	2	21.7	52.1	13.5	26.1	27.6	30.7	2.1	(38)	
(39)	55	51	57	55	57	3	4.6	52.5	7.4	9.1	28.2	53.4	1.9	(39)	
(40)	68	58	66	68	76	8	2.9	64.3	8.1	5.0	35.0	49.0	2.9	(40)	
(41)	61	54	60	63	77	3	2.3	59.3	8.0	4.3	33.4	51.8	2.5	(41)	
(42)	33	36	41	27	35	2	2.7	31.1	9.2	7.6	37.5	44.4	1.3	(42)	
(43)	77	84	26	84	100	2	17.7	79.8	4.0	21.1	12.6	57.7	4.6	(43)	
(44)	37	..	44	34	100	1	..	35.1	9.9	3.5	35.8	49.7	1.1	(44)	
(45)	28	16	27	23	72	3	1.8	30.8	16.0	11.5	29.2	35.3	8.0	(45)	
(46)	21	11	12	27	52	12	1.5	22.2	13.2	13.3	29.3	37.8	5.9	(46)	
(47)	32	16	26	37	49	1	2.3	32.2	7.9	14.3	18.1	55.4	4.3	(47)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Grass mixed hay, all expts	86.7	6.5	52.0	7.0	6.8	11.2	25.0	41.0	2.7	(1)
(2)	—mixed hay, prebloom...	84.7	6.9	61.2	7.8	5.7	11.0	21.8	43.6	2.6	(2)
(3)	—mixed hay, full bloom...	88.7	4.1	55.9	12.6	5.8	7.6	26.7	46.4	2.2	(3)
(4)	—mixed hay, postbloom...	85.3	2.6	44.2	16.5	4.3	5.4	27.5	46.4	1.7	(4)
(5)	—mixed hay, dehydrated	85.4	9.2	57.0	5.1	8.2	13.8	20.8	39.9	2.7	(5)
(6)	—mixed hay, dehydrated prebloom...	85.0	8.3	58.5	6.0	7.1	12.4	21.6	41.9	2.0	(6)
(7)	—mixed hay, under 25% fiber	86.7	9.8	57.5	4.9	8.3	14.4	20.5	40.1	3.4	(7)
(8)	—mixed hay, 25-28% fiber	87.0	6.1	52.2	7.5	6.4	10.4	26.2	41.7	2.3	(8)
(9)	—mixed hay, over 28% fiber	85.4	2.6	42.7	15.5	5.9	6.8	31.1	40.1	1.5	(9)
(10)	—mixed hay, weathered...	87.0	2.8	42.0	14.3	5.7	7.2	31.0	41.6	1.5	(10)
(11)	—mixed hay, 2d cutting...	86.5	8.8	52.4	4.9	6.9	13.4	24.7	37.9	3.6	(11)
(12)	—mixed, immature, dried	88.2	11.8	60.8	4.1	10.1	16.9	18.4	39.1	3.7	(12)
(13)	—immature, dried, British Isles	(84.6)	7.0	51.2	6.3	9.2	11.2	22.8	40.3	1.1	(13)
(14)	—immature, air dried, Europe	82.1	10.5	55.0	4.2	12.6	14.4	18.9	33.6	2.6	(14)
(15)	—immature, dried, Europe	86.4	13.4	62.9	3.7	9.2	17.9	15.4	39.1	4.8	(15)
(16)	—meal, very immature, dehydrated	87.7	17.9	64.7	2.6	11.0	22.9	13.5	34.7	5.6	(16)
(17)	—mixed hay meal, dehydrated	86.1	14.6	62.9	3.3	10.9	18.9	15.3	36.7	4.3	(17)
(18)	—mixed, low fiber, fed green	25.3	4.4	18.9	3.3	3.0	5.6	4.0	11.2	1.5	(18)
(19)	—mixed, medium fiber, fed green	23.7	3.5	16.8	3.8	2.6	4.6	4.8	10.5	1.2	(19)
(20)	—mixed, high fiber, fed green	22.5	1.8	14.7	7.3	2.0	2.8	6.2	10.8	0.7	(20)
(21)	—mixed, low protein, fed green	28.9	1.3	18.3	13.5	2.3	2.4	8.1	15.5	0.6	(21)
(22)	—mixed, medium protein, fed green	22.9	2.7	15.8	4.9	2.4	3.8	5.2	10.6	0.9	(22)
(23)	—mixed, high protein, fed green	24.6	4.5	18.2	3.0	2.9	5.7	4.2	10.3	1.5	(23)
(24)	—mixed, fed green, British Isles	24.4	3.4	17.5	4.2	2.6	4.5	4.9	11.3	1.1	(24)
(25)	—mixed, immature, fed green, British Isles	24.0	4.0	17.7	3.4	2.7	5.0	4.4	10.5	1.4	(25)
(26)	—mixed, prebloom, fed green, British Isles	24.2	2.5	17.4	6.0	2.2	3.5	5.5	12.4	0.6	(26)
(27)	—mixed, early bloom, fed green, British Isles	25.2	1.8	17.6	8.6	2.1	2.9	6.2	13.4	0.6	(27)
(28)	—mixed, postbloom, fed green, British Isles	30.8	1.4	19.8	13.2	2.2	2.5	8.7	16.7	0.7	(28)
(29)	—mixed, fed green, Europe	18.9	2.3	12.6	4.5	1.9	3.1	5.2	7.9	0.8	(29)
(30)	—mixed, fed green, Europe (Goats)	24.4	2.6	16.2	5.3	3.3	3.7	5.9	10.6	0.9	(30)
(31)	—mixed, prebloom, fed green, Europe	18.0	2.6	11.5	3.5	2.5	3.3	4.3	7.1	0.8	(31)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							$\%$	$\%$						$\%$	
( 1 )	64	58	66	64	46	55	7.5	60.0	7.9	12.9	28.8	47.3	3.1	( 1 )	
( 2 )	75	63	70	81	63	1	8.2	72.3	6.7	13.0	25.7	51.5	3.1	( 2 )	
( 3 )	73	54	66	68	53	3	4.6	63.0	6.5	8.6	30.1	52.3	2.5	( 3 )	
( 4 )	54	47	47	60	23	1	3.0	51.8	5.0	6.3	32.2	54.5	2.0	( 4 )	
( 5 )	72	67	74	73	52	17	10.8	66.7	9.6	16.2	24.3	46.7	3.2	( 5 )	
( 6 )	74	67	78	74	51	2	9.8	68.8	8.3	14.6	25.4	49.3	2.4	( 6 )	
( 7 )	71	68	72	72	53	40	11.3	66.3	9.6	16.6	23.6	46.3	3.9	( 7 )	
( 8 )	66	59	65	64	45	14	7.0	60.0	7.4	11.9	30.1	47.9	2.7	( 8 )	
( 9 )	53	38	59	51	39	10	3.0	50.0	6.9	8.0	36.4	46.9	1.8	( 9 )	
(10)	51	38	57	49	36	8	3.2	48.3	6.5	8.3	35.6	47.9	1.7	(10)	
(11)	64	66	66	62	47	17	10.2	60.6	8.0	15.5	28.6	43.7	4.2	(11)	
(12)	75	70	75	77	60	12	13.4	68.9	11.4	19.2	20.9	44.3	4.2	(12)	
(13)	68	63	69	71	-7	2	8.3	60.5	10.9	13.2	27.0	47.6	1.3	(13)	
(14)	76	73	80	76	65	2	12.8	67.0	15.3	17.6	23.0	40.9	3.2	(14)	
(15)	77	75	74	79	66	4	15.5	72.8	10.6	20.7	17.8	45.3	5.6	(15)	
(16)	78	78	78	79	71	2	20.4	73.8	12.6	26.1	15.4	39.5	6.4	(16)	
(17)	78	77	79	80	72	4	16.9	73.1	12.7	22.0	17.8	42.5	5.0	(17)	
(18)	80	79	80	83	58	34	17.5	74.7	11.7	22.1	15.8	44.5	5.9	(18)	
(19)	77	76	78	79	48	47	14.9	70.9	11.0	19.6	20.1	44.4	4.9	(19)	
(20)	71	64	70	72	53	27	7.9	65.4	9.0	12.3	27.5	48.3	2.9	(20)	
(21)	68	53	67	71	43	8	4.4	63.2	8.0	8.2	28.2	53.5	2.1	(21)	
(22)	75	72	75	77	50	55	11.8	69.2	10.4	16.4	22.5	46.7	4.0	(22)	
(23)	80	80	80	81	57	45	18.4	74.0	11.6	23.0	16.9	42.5	6.0	(23)	
(24)	77	75	78	80	52	124	14.0	71.9	10.6	18.6	20.0	46.1	4.7	(24)	
(25)	79	79	80	81	54	69	16.6	73.7	11.1	21.0	18.3	43.9	5.7	(24)	
(26)	77	72	78	79	52	12	10.3	71.7	8.9	14.3	22.9	51.4	2.5	(26)	
(27)	75	64	76	77	52	6	7.3	69.8	8.2	11.4	24.7	53.5	2.2	(27)	
(28)	63	55	64	72	54	8	4.5	64.2	7.3	8.2	28.3	53.9	2.3	(28)	
(29)	71	74	69	71	60	10	12.1	66.5	9.9	16.3	27.7	42.0	4.1	(29)	
(30)	73	70	66	79	64	1	10.6	66.2	13.6	15.1	24.0	43.5	3.8	(30)	
(31)	70	77	70	67	67	2	14.2	63.8	13.9	13.4	23.9	39.6	4.2	(31)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total d nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Grass, mixed, 2d cutting, late fall after snow, fed green.....	24.0	1.0	10.8	10.1	2.8	2.4	6.7	11.4	0.7	(1)
(2)	—silage, all expts.....	29.2	2.6	18.5	6.2	3.3	4.4	8.4	11.8	1.3	(2)
(3)	—silage, late fall after snow.....	21.0	1.7	11.4	5.8	2.3	2.7	5.4	9.6	1.0	(3)
(4)	—silage, low fiber.....	30.4	3.4	20.2	5.0	3.8	5.2	7.6	12.2	1.6	(4)
(5)	—silage, high fiber.....	27.7	1.8	16.6	8.3	2.7	3.4	9.0	11.6	1.0	(5)
(6)	—silage, low protein.....	23.5	1.1	13.5	11.2	2.3	2.4	8.2	9.8	0.8	(6)
(7)	—silage, medium protein	26.4	2.1	16.7	6.8	2.7	3.7	7.6	11.3	1.1	(7)
(8)	—silage, high protein....	21.6	3.1	14.8	3.8	3.0	4.3	5.2	7.8	1.3	(8)
(9)	—silage, British Isles....	22.4	2.2	15.2	5.8	2.5	3.6	6.4	8.8	1.1	(9)
(10)	—silage, very immature, British Isles.....	21.3	3.2	14.7	3.6	2.3	4.1	5.0	8.9	1.0	(10)
(11)	—silage, prebloom, British Isles.....	25.3	2.8	17.5	5.3	2.6	4.0	6.8	10.8	1.1	(11)
(12)	—silage, early bloom, British Isles.....	22.2	1.4	14.5	9.5	2.1	2.4	7.0	10.1	0.6	(12)
(13)	—silage, full bloom, British Isles.....	25.1	1.0	14.4	12.8	1.9	2.6	8.7	11.4	0.5	(13)
(14)	—silage, pit or stack, British Isles.....	24.6	2.0	14.7	6.3	2.5	3.7	7.1	10.6	0.7	(14)
(15)	—silage, prebloom, pit or stack, British Isles....	24.6	2.3	16.1	6.2	2.3	3.7	6.9	10.9	0.8	(15)
(16)	—silage, East Africa.....	22.9	0.8	9.9	11.3	2.3	1.7	8.4	9.7	0.8	(16)
(17)	—silage, Europe.....	33.3	2.4	19.7	7.1	3.7	4.9	9.6	13.5	1.6	(17)
(18)	—silage, Europe.....	38.7	1.7	21.6	12.1	4.2	4.9	10.0	17.9	1.7	(18)
(19)	—silage, prebloom, Europe	18.1	2.0	11.6	4.7	2.4	3.2	5.5	6.0	1.0	(19)
(20)	—silage, full bloom, Europe	23.3	1.4	13.7	8.3	2.0	2.4	7.4	10.8	0.7	(20)
(21)	—silage, stack, Europe....	20.3	0.2	8.1	51.5	2.4	2.6	7.9	6.8	0.6	(21)
(22)	—silage, New Zealand....	(29.3)	2.3	19.5	7.3	3.2	4.1	10.5	10.0	1.5	(22)
(23)	—silage, immature, New Zealand.....	(21.3)	4.0	16.9	3.3	3.0	5.1	5.3	5.4	2.5	(23)
(24)	—silage, prebloom, New Zealand.....	(21.3)	3.7	15.6	3.3	3.1	5.2	5.8	5.3	1.9	(24)
(25)	—silage, early bloom, New Zealand.....	(22.0)	1.6	14.4	8.3	2.4	2.9	8.0	7.4	1.3	(25)
(26)	—silage, mature, New Zealand.....	(27.7)	1.5	18.2	11.0	2.9	3.0	10.5	10.4	0.9	(26)
(27)	—silage, Washington....	22.5	1.5	13.4	8.0	2.1	2.8	7.0	9.8	0.8	(27)
(28)	—silage, A. I. V.....	22.9	2.5	15.0	4.9	3.0	3.8	5.7	9.4	1.0	(28)
(29)	—silage, early bloom, A. I. V.....	23.0	1.4	15.0	9.9	2.2	2.5	6.9	10.9	0.5	(29)
(30)	—silage, A. I. V. acid and sugar added.....	19.9	2.2	14.0	5.3	2.1	3.1	5.1	8.7	0.9	(30)
(31)	—silage, HCl added.....	23.7	2.0	14.3	6.0	2.7	3.3	7.5	8.9	1.3	(31)
(32)	—silage, lactic acid bacteria and dried whey added.....	24.2	2.3	18.2	7.0	2.3	3.2	6.0	11.7	1.0	(32)
(33)	—silage, prebloom, lactic acid bacteria and dried whey added....	23.9	2.2	17.8	7.2	2.3	3.1	6.0	11.5	1.0	(33)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%						%	
( 1 )	51	41	58	51	6	1	4.1	45.0	11.7	9.9	28.1	47.5	2.8	( 1 )	
( 2 )	68	59	76	66	59	84	8.8	63.5	11.2	14.9	28.6	40.7	4.6	( 2 )	
( 3 )	58	62	66	53	49	1	8.0	54.5	11.0	12.9	25.5	45.6	5.0	( 3 )	
( 4 )	72	65	78	70	63	45	11.1	66.3	12.4	17.1	25.1	40.1	5.3	( 4 )	
( 5 )	64	52	72	61	55	39	6.4	59.9	9.7	12.4	32.6	41.6	3.7	( 5 )	
( 6 )	61	47	69	58	54	14	4.7	57.3	9.6	10.0	35.0	42.1	3.3	( 6 )	
( 7 )	67	57	75	66	58	48	8.1	63.2	10.4	14.2	28.6	42.5	4.3	( 7 )	
( 8 )	74	72	82	71	65	21	14.4	68.4	14.1	20.0	23.9	35.9	6.1	( 8 )	
( 9 )	72	62	81	69	67	43	9.9	67.8	11.0	16.0	28.6	39.4	5.0	( 9 )	
(10)	74	78	77	71	61	2	15.1	69.1	11.0	19.4	23.3	41.5	4.8	(10)	
(11)	72	70	77	71	73	3	11.0	69.3	10.1	15.7	26.9	43.0	4.3	(11)	
(12)	71	56	76	72	47	2	6.2	65.5	9.6	11.0	31.6	45.3	2.5	(12)	
(13)	61	40	68	59	62	2	4.2	57.3	7.7	10.4	34.8	45.0	2.1	(13)	
(14)	64	54	68	65	62	8	8.2	59.9	10.0	15.1	28.9	43.1	2.9	(14)	
(15)	70	61	73	70	67	6	9.2	65.6	9.3	15.0	27.9	44.5	3.3	(15)	
(16)	45	47	53	37	60	2	3.5	43.2	10.2	7.5	36.9	42.0	3.4	(16)	
(17)	64	50	72	63	50	15	7.3	59.1	11.0	14.6	28.8	40.8	4.8	(17)	
(18)	59	34	72	57	66	6	4.3	55.9	10.8	12.6	25.9	46.2	4.5	(18)	
(19)	70	63	80	67	52	1	11.2	64.3	13.0	17.8	30.6	33.2	5.4	(19)	
(20)	64	59	59	63	72	1	6.0	58.7	8.8	10.1	31.7	46.5	2.9	(20)	
(21)	45	6	71	31	16	2	0.8	39.9	11.8	12.6	38.9	33.7	3.0	(21)	
(22)	68	57	82	60	76	3	8.0	66.5	10.8	14.0	35.7	34.5	5.0	(22)	
(23)	79	78	87	74	77	2	18.6	79.4	13.9	23.9	24.9	25.7	11.6	(23)	
(24)	77	74	89	67	75	2	17.2	73.1	14.6	24.2	27.2	25.2	8.8	(24)	
(25)	69	54	82	60	65	4	7.1	65.7	11.0	13.1	36.4	33.6	5.9	(25)	
(26)	70	51	81	65	67	1	5.5	65.6	10.3	10.7	37.9	37.9	3.2	(26)	
(27)	64	54	71	61	51	11	6.6	59.5	9.4	12.3	31.1	43.5	3.7	(27)	
(28)	72	67	79	71	55	12	11.0	65.3	13.0	16.4	25.0	41.4	4.2	(28)	
(29)	71	56	76	72	47	2	6.0	65.4	9.5	10.7	30.1	47.4	2.3	(29)	
(30)	74	72	82	72	65	1	11.2	70.4	10.5	15.5	25.6	43.9	4.5	(30)	
(31)	65	61	71	63	47	1	8.6	60.3	11.6	14.1	31.6	27.3	5.4	(31)	
(32)	79	71	82	80	69	12	9.4	75.0	9.5	13.2	25.0	48.0	4.3	(32)	
(33)	79	70	82	80	69	10	9.1	74.6	9.5	13.0	25.1	48.4	4.0	(33)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Grass silage, molasses added	23.4	2.9	15.8	4.5	3.5	4.0	5.4	9.2	1.3	(1)
(2)	—silage, very immature, molasses added.....	21.3	3.5	14.8	3.3	3.6	4.8	4.5	6.7	1.7	(2)
(3)	—silage, prebloom, molasses added.....	24.3	2.1	17.8	7.5	2.2	3.0	6.4	11.9	0.8	(3)
(4)	—silage, molasses and acid added.....	21.1	2.4	14.9	5.2	2.3	3.4	6.1	8.3	1.0	(4)
(5)	—silage, prebloom, molasses and acid added	25.3	2.4	18.7	6.9	2.2	3.3	7.7	11.7	0.9	(5)
(6)	—silage, mature, salt added.....	24.1	0.8	14.2	15.9	2.9	2.3	7.1	11.2	0.6	(6)
(7)	—silage, 2d cutting, British Isles.....	(29.3)	2.1	17.6	7.5	3.3	3.5	7.5	14.2	0.8	(7)
(8)	Grass legume mixed hay...	88.2	5.2	46.0	7.9	7.2	9.8	28.9	40.3	2.0	(8)
(9)	—mixed fodder, fed green	21.4	2.2	12.7	4.7	2.1	3.1	6.8	8.8	0.6	(9)
(10)	—mixed silage.....	23.6	1.5	12.9	7.5	2.6	3.0	8.7	8.6	0.7	(10)
(11)	Guar hay.....	90.8	12.3	51.7	3.2	12.3	16.5	19.3	41.3	1.4	(11)
(12)	Guineagrass, fed green, all expts.....	29.7	1.0	15.7	14.4	3.0	1.8	10.5	13.7	0.7	(12)
(13)	—prebloom, fed green....	24.2	1.2	14.0	11.1	1.9	2.2	7.9	11.8	0.4	(13)
(14)	—early bloom, fed green.	24.2	0.6	12.8	18.3	1.4	1.4	10.1	10.9	0.4	(14)
(15)	—1st cutting, full bloom, fed green.....	29.7	3.2	15.5	15.1	3.2	1.7	10.5	13.6	0.7	(15)
(16)	—silage, early bloom....	20.6	0.4	9.7	23.1	4.0	1.3	8.2	6.5	0.6	(16)
(17)	Hawksbeard fodder, gray, dry.....	93.3	5.3	54.7	9.3	8.8	8.4	23.5	49.2	3.4	(17)
(18)	Hay, British Isles.....	84.4	4.0	50.2	11.8	6.5	8.2	26.2	41.8	1.7	(18)
(19)	—early bloom, British Isles.....	82.6	6.0	54.2	8.0	6.9	10.4	23.2	40.4	1.7	(19)
(20)	—full bloom, British Isles	84.7	2.5	43.5	16.6	6.4	8.8	27.5	39.5	2.5	(20)
(21)	—late bloom, British Isles	83.4	3.2	47.0	14.0	6.3	6.8	28.4	40.7	1.2	(21)
(22)	—postbloom, British Isles	84.5	2.9	50.3	16.3	6.3	6.6	26.3	43.8	1.5	(22)
(23)	—mature, British Isles	88.8	5.0	53.3	9.8	5.9	9.3	25.6	46.2	1.8	(23)
(24)	—overripe, British Isles	85.3	2.0	47.7	23.8	5.6	6.2	28.5	43.6	1.4	(24)
(25)	—mixed, Colorado.....	94.9	4.6	45.1	9.0	10.7	7.3	31.5	42.3	3.1	(25)
(26)	—East Africa.....	89.2	3.0	41.3	12.4	8.2	6.7	31.8	40.8	1.7	(26)
(27)	—meadow, Europe.....	86.2	6.0	51.0	7.5	7.1	10.0	25.8	40.8	2.5	(27)
(28)	—meadow, Europe (Goats)	86.8	4.4	49.0	10.1	7.1	8.3	27.9	41.5	2.0	(28)
(29)	—meadow, Europe.....	82.4	4.4	47.5	9.7	5.3	8.7	22.2	44.1	2.1	(29)
(30)	—meadow, prebloom, Europe.....	89.4	9.6	57.8	5.1	8.3	13.2	28.4	36.5	3.0	(30)
(31)	—meadow, full bloom, Europe.....	89.7	3.6	51.2	13.2	6.5	7.4	28.7	45.2	1.9	(31)
(32)	—meadow, postbloom, Europe.....	88.3	8.1	60.8	6.4	6.9	11.8	23.3	42.4	3.9	(32)
(33)	—meadow, overripe, Europe.....	86.6	4.2	47.5	10.5	6.3	7.4	33.1	37.5	2.3	(33)
(34)	—meadow, air dried, Europe.....	85.2	7.4	49.8	5.7	7.1	11.8	27.3	36.4	2.6	(34)
(35)	—meadow, postbloom, air dried, Europe.....	84.2	6.8	51.4	6.6	6.7	9.4	29.4	36.4	2.3	(35)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
( 1 )	75	71	79	74	67	14	12.3	67.7	15.0	17.3	23.0	39.3	5.4	( 1 )	
( 2 )	75	72	86	71	71	2	16.3	69.3	17.1	22.6	21.0	31.3	8.0	( 2 )	
( 3 )	78	69	79	80	65	2	8.6	73.2	9.0	12.5	26.5	48.9	3.1	( 3 )	
( 4 )	75	71	83	72	65	10	11.3	70.5	11.0	15.9	28.7	39.8	4.6	( 4 )	
( 5 )	74	71	80	75	59	2	9.2	72.4	8.7	12.9	29.8	45.3	3.3	( 5 )	
( 6 )	65	37	70	68	54	1	3.5	58.9	12.0	9.4	29.5	46.6	2.5	( 6 )	
( 7 )	66	59	70	69	22	2	7.1	59.9	11.1	12.0	25.6	48.6	2.7	( 7 )	
( 8 )	56	53	52	59	45	8	5.9	52.2	8.2	11.1	32.8	45.6	2.3	( 8 )	
( 9 )	64	71	54	69	52	2	10.4	59.3	9.6	14.7	31.9	40.8	3.0	( 9 )	
(10)	59	51	60	60	58	2	6.4	54.5	10.9	12.6	37.0	36.4	3.1	(10)	
(11)	65	75	45	73	16	2	13.6	56.9	13.6	18.2	21.3	45.4	1.5	(11)	
(12)	58	56	59	56	52	18	3.4	52.8	10.1	6.1	35.4	46.1	2.3	(12)	
(13)	63	52	69	61	21	4	4.8	57.8	7.9	9.2	32.8	48.5	1.6	(13)	
(14)	55	49	61	51	45	1	2.7	53.0	5.6	5.6	41.8	45.5	1.5	(14)	
(15)	57	58	57	56	57	12	10.8	52.2	10.8	5.6	35.4	45.7	2.5	(15)	
(16)	57	31	72	45	35	2	2.0	46.9	19.6	6.3	39.7	31.7	2.7	(16)	
(17)	63	63	36	78	33	2	5.7	58.6	9.4	9.0	25.2	52.8	3.6	(17)	
(18)	63	48	66	65	48	78	4.7	59.5	7.7	9.7	31.0	49.6	2.0	(18)	
(19)	71	58	77	71	44	30	7.3	65.6	8.4	12.6	28.1	48.9	2.0	(19)	
(20)	54	28	52	59	62	3	2.9	51.4	7.6	10.4	32.5	46.6	2.9	(20)	
(21)	60	46	64	60	48	4	3.8	56.4	7.6	8.2	34.0	48.7	1.5	(21)	
(22)	63	44	65	66	40	11	3.4	59.5	7.5	7.8	31.1	51.8	1.8	(22)	
(23)	63	53	60	67	51	6	5.6	60.0	6.7	10.5	28.8	52.0	2.0	(23)	
(24)	59	31	62	61	49	3	2.3	55.9	6.6	7.3	33.4	51.0	1.7	(24)	
(25)	53	62	56	51	20	3	1.8	47.5	11.3	7.7	33.2	44.5	3.3	(25)	
(26)	50	46	54	47	50	17	3.4	46.3	9.2	7.5	35.7	45.7	1.9	(26)	
(27)	63	60	62	64	52	539	7.0	59.2	8.2	11.6	29.9	47.4	2.9	(27)	
(28)	60	53	62	60	52	7	5.1	56.4	8.2	9.6	32.2	47.7	2.3	(28)	
(29)	62	51	60	63	12	3	5.4	57.6	6.4	10.5	27.0	53.5	2.6	(29)	
(30)	68	72	69	67	62	2	10.7	64.6	9.3	14.8	31.8	40.7	3.4	(30)	
(31)	60	49	61	61	59	1	4.0	57.1	7.2	8.2	32.0	50.5	2.1	(31)	
(32)	71	69	66	75	62	2	9.2	68.8	7.8	13.4	26.4	48.0	4.4	(32)	
(33)	58	56	61	56	43	2	4.8	54.9	7.3	8.5	38.2	43.3	2.7	(33)	
(34)	62	63	66	60	41	16	8.7	58.4	8.3	13.8	32.1	42.7	3.1	(34)	
(35)	64	72	66	62	52	2	8.1	61.0	8.0	11.2	34.9	43.2	2.7	(35)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Hay, meadow, dehydrated, Europe.....	85.8	7.7	55.2	6.2	8.4	11.8	24.7	37.8	3.1	( 1 )
( 2 )	—meadow, dehydrated, Europe (Goats) .....	91.5	9.4	59.9	5.3	10.7	14.1	21.6	42.0	3.1	( 2 )
( 3 )	—meadow, 1st cutting, dried on riders, Europe.....	87.5	9.0	54.2	5.0	6.5	13.6	26.8	37.8	2.8	( 3 )
( 4 )	—meadow, acid soil, Europe.....	(87.0)	7.2	48.5	5.8	6.3	11.2	24.6	42.9	2.0	( 4 )
( 5 )	—meadow, alkaline soil, Europe.....	(87.0)	7.0	49.6	6.1	6.3	11.3	26.6	40.7	2.1	( 5 )
( 6 )	—meadow, fertilized, Europe.....	86.5	5.9	44.6	6.6	6.8	10.6	25.9	41.0	2.2	( 6 )
( 7 )	—meadow, fertilized and limed, Europe.....	(87.0)	6.2	41.6	5.8	5.5	11.0	27.8	41.1	1.6	( 7 )
( 8 )	—meadow, limed, Europe.....	(87.0)	6.3	49.5	6.9	6.2	10.4	27.0	41.6	1.8	( 8 )
( 9 )	—meadow, sewage irrigated, Europe.....	84.8	10.3	45.4	3.4	8.8	15.8	26.2	31.7	2.3	( 9 )
(10)	—mountain, Europe.....	85.5	6.1	52.3	7.7	5.9	10.8	17.6	47.4	3.8	(10)
(11)	—upland, Europe.....	78.8	6.2	46.6	6.4	4.7	10.1	22.9	39.4	1.7	(11)
(12)	—Japan.....	87.5	4.5	46.6	9.4	10.1	9.1	26.7	39.5	2.1	(12)
(13)	—lowland, Nevada.....	95.2	6.5	70.3	9.8	8.4	9.1	24.8	49.2	3.7	(13)
(14)	—New England.....	89.2	2.4	47.0	18.6	6.5	5.7	28.9	45.4	2.7	(14)
(15)	—bush, Queensland.....	83.7	0.4	43.9	101.7	4.6	2.7	30.6	45.1	0.7	(15)
(16)	—prairie lowland, South Dakota.....	85.7	2.4	43.6	17.1	10.4	5.7	25.1	42.1	2.4	(16)
(17)	—prairie upland, South Dakota.....	87.6	1.7	41.1	23.8	7.3	5.2	27.8	44.7	2.6	(17)
(18)	—prairie, Texas.....	92.1	0.8	46.0	56.4	7.4	4.7	31.0	46.8	2.2	(18)
(19)	—western mixed, Washington.....	85.6	4.1	47.5	10.5	6.2	7.5	30.8	39.4	1.7	(19)
(20)	—2d cutting, British Isles.....	(87.0)	5.1	50.3	8.7	9.6	9.6	24.3	40.9	2.6	(20)
(21)	—2d cutting, mature, East Africa.....	91.0	3.6	35.9	8.8	9.1	6.9	33.1	40.4	1.5	(21)
(22)	—meadow, 2d and 3d cutting, Europe.....	84.5	6.6	48.2	6.3	7.9	11.0	23.9	38.7	3.0	(22)
(23)	—meadow, 2d cutting, overripe, Europe.....	85.1	5.7	47.3	7.4	9.2	10.1	21.7	41.0	3.1	(23)
(24)	—meadow, 2d and 3d cutting, dehydrated, Europe.....	82.8	12.9	54.5	3.2	10.9	17.6	19.4	31.4	3.5	(24)
(25)	—2d and 3d cutting, dried on riders, Europe.....	82.8	8.1	47.9	4.9	8.5	12.7	24.2	34.8	2.6	(25)
(26)	—meadow, 2d cutting, limed, Europe.....	(87.0)	7.3	51.3	6.0	7.1	11.8	23.8	41.9	2.4	(26)
(27)	—meal, meadow, Europe.....	94.2	7.3	46.0	5.2	7.6	12.7	34.1	37.6	2.2	(27)
(28)	Heath, crossleaf, dry.....	88.8	-0.8	25.8	.....	5.8	5.3	25.9	41.7	10.1	(28)
(29)	Heather, Scotch, dry.....	89.0	0.4	40.0	120.6	7.6	5.5	19.9	48.1	7.9	(29)
(30)	Hemp screenings.....	89.6	11.4	31.3	1.8	16.3	19.6	23.2	26.1	4.4	(30)
(31)	Hempseed oil meal, all expts.....	90.5	24.3	42.6	0.8	8.9	30.0	24.5	20.6	6.5	(31)
(32)	—oil meal, dark green, coarse ground.....	91.1	25.6	46.0	0.8	9.3	30.5	24.3	19.7	7.3	(32)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row N	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
( 1 )	68	65	68	70	61	12	9.0	64.3	9.8	13.8	28.8	44.0	3.6	( 1 )	
( 2 )	71	67	62	78	62	1	10.3	65.5	11.7	15.4	23.6	45.9	3.4	( 2 )	
( 3 )	65	66	66	65	48	11	10.3	62.0	7.4	15.6	30.6	43.2	3.2	( 3 )	
( 4 )	59	64	62	56	46	2	8.3	55.8	7.2	12.9	28.3	49.3	2.3	( 4 )	
( 5 )	60	62	64	57	50	4	8.1	57.0	7.2	13.0	30.6	46.8	2.4	( 5 )	
( 6 )	55	55	61	53	27	10	6.8	51.6	7.9	12.3	29.9	47.3	2.6	( 6 )	
( 7 )	50	56	56	45	38	8	7.1	47.8	6.3	12.6	32.0	47.3	1.8	( 7 )	
( 8 )	60	60	66	57	42	19	7.2	56.9	7.1	12.0	31.0	47.8	2.1	( 8 )	
( 9 )	62	65	58	58	30	14	12.1	53.5	10.4	18.6	30.9	37.4	2.7	( 9 )	
(10)	64	56	51	72	37	4	7.1	61.2	6.9	12.6	20.6	55.5	4.4	(10)	
(11)	68	62	61	63	42	297	7.9	59.2	6.0	12.8	29.0	50.0	2.2	(11)	
(12)	58	49	64	58	42	8	5.1	53.2	11.5	10.4	30.5	45.2	2.4	(12)	
(13)	77	71	78	77	79	2	6.8	73.8	8.8	9.6	26.0	51.7	3.9	(13)	
(14)	55	42	53	58	49	1	2.7	52.7	7.3	6.4	32.4	50.9	3.0	(14)	
(15)	55	16	62	53	34	2	0.5	52.4	5.5	3.2	36.6	53.9	0.8	(15)	
(16)	56	42	60	57	40	2	2.8	50.9	12.1	6.7	29.3	49.1	2.8	(16)	
(17)	51	32	53	51	32	6	1.9	46.9	8.3	5.9	31.7	51.1	3.0	(17)	
(18)	53	17	58	53	48	18	0.9	49.9	8.0	5.1	33.7	50.8	2.4	(18)	
(19)	58	55	55	62	53	3	4.8	55.5	7.2	8.8	36.0	46.0	2.0	(19)	
(20)	64	54	70	64	33	4	5.9	57.8	11.0	11.0	27.9	47.1	3.0	(20)	
(21)	43	53	44	40	46	2	4.0	39.5	10.0	7.6	36.4	44.4	1.6	(21)	
(22)	61	60	61	62	45	46	7.8	57.0	9.4	13.0	28.3	45.8	3.5	(22)	
(23)	60	56	62	61	46	3	6.7	55.6	10.8	11.9	25.5	48.1	3.7	(23)	
(24)	72	73	80	68	61	10	15.6	65.8	13.2	21.3	23.4	37.9	4.2	(24)	
(25)	64	64	71	58	41	6	9.8	57.8	10.3	15.3	29.2	42.1	3.1	(25)	
(26)	62	62	65	62	48	8	8.4	59.0	8.2	13.6	27.4	48.0	2.8	(26)	
(27)	52	58	46	55	46	2	7.8	48.8	8.1	13.5	36.2	39.9	2.3	(27)	
(28)	28	-16	12	50	12	4	-0.9	29.1	6.5	6.0	29.2	46.9	11.4	(28)	
(29)	46	6	21	68	16	6	0.4	45.0	8.5	6.2	22.4	54.0	8.9	(29)	
(30)	41	58	27	43	25	7	12.7	34.9	18.2	21.9	25.9	29.1	4.9	(30)	
(31)	43	81	5	26	80	7	26.9	47.1	9.8	33.2	27.1	22.7	7.2	(31)	
(32)	46	84	13	14	88	3	28.1	50.5	10.2	33.5	26.7	21.6	8.0	(32)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Hempseed oil meal, light brown, finely ground....	92.8	26.4	40.8	0.5	8.7	31.4	23.3	24.3	5.1	(1)
(2)	Hemp vetch mixed silage..	21.2	1.9	12.0	5.4	2.2	2.8	6.8	8.5	0.9	(2)
(3)	Heronbill hay.....	85.6	2.4	42.4	16.8	7.9	3.6	29.3	43.4	1.4	(3)
(4)	Hominy feed.....	88.6	6.7	81.2	11.0	2.8	10.5	4.7	62.1	8.5	(4)
(5)	Hops, dried spent.....	92.0	5.9	32.4	4.5	5.1	19.6	22.4	38.6	6.3	(5)
(6)	Horn meal.....	92.6	23.4	24.4	0.0	1.9	90.2	.....	.....	0.6	(6)
(7)	Horsebean straw.....	84.5	3.7	41.5	10.2	5.9	7.9	35.2	34.5	1.0	(7)
(8)	—fodder, full bloom, fed green.....	12.2	1.7	6.8	3.0	2.5	2.2	3.8	3.4	0.3	(8)
(9)	Horsethorns, shells removed	90.4	1.8	56.2	30.9	2.2	7.1	2.5	72.1	6.5	(9)
(10)	Ivory nut meal.....	89.0	0.7	77.5	106.6	1.2	4.8	7.0	75.1	0.9	(10)
(11)	—residue meal.....	90.2	-0.4	68.6	.....	2.2	5.2	48.7	31.8	2.3	(11)
(12)	Jackbeans, seed.....	88.9	25.2	79.7	2.2	2.9	30.0	8.7	44.9	2.4	(12)
(13)	Japanesemillet fodder, fed green.....	28.9	0.9	18.0	19.4	2.1	1.8	8.9	15.2	0.9	(13)
(14)	—fodder, late bloom, fed green.....	24.4	1.0	14.3	12.9	2.1	1.8	7.6	12.2	0.7	(14)
(15)	—fodder, postbloom, fed green.....	31.2	0.8	19.9	23.7	2.1	1.7	9.6	16.8	1.0	(15)
(16)	Johnsongrass hay.....	90.6	3.2	49.6	14.6	8.7	7.2	29.1	44.1	1.5	(16)
(17)	—hay, early bloom (Goats)	87.7	2.6	45.9	16.6	5.2	5.8	30.3	44.7	1.7	(17)
(18)	Kale, marrow, dry.....	92.1	6.3	68.0	9.8	9.6	8.7	18.1	53.8	1.9	(18)
(19)	—blue thickstem, fed green	9.3	1.6	6.5	4.1	1.3	1.7	2.0	4.1	0.2	(19)
(20)	—marrow, fed green.....	12.8	1.8	9.2	4.2	1.9	2.1	2.2	6.2	0.4	(20)
(21)	—marrow, fed green.....	15.0	1.5	11.2	6.5	1.7	2.0	2.4	8.5	0.4	(21)
(22)	—marrow, very immature, fed green.....	13.4	1.6	9.6	5.1	1.9	2.0	2.5	6.6	0.4	(22)
(23)	—marrow, very immature, fed green.....	14.2	1.7	10.2	5.0	1.7	2.2	2.6	7.3	0.4	(23)
(24)	—marrow, prebloom, fed green.....	12.8	2.5	9.5	2.8	2.0	2.8	1.5	6.1	0.4	(24)
(25)	—leaves, marrow, fed green	17.9	2.7	14.1	4.2	2.1	3.3	1.6	10.3	0.6	(25)
(26)	—stems, fed green.....	15.9	1.0	11.5	10.5	1.4	1.4	3.1	9.8	0.2	(26)
(27)	—silage, marrow.....	13.3	1.3	8.9	6.0	2.0	1.7	2.7	6.5	0.4	(27)
(28)	—silage, marrow.....	(13.3)	2.0	10.1	4.1	2.0	2.4	2.3	6.0	0.6	(28)
(29)	—silage, marrow, prebloom.....	15.9	1.5	11.3	6.4	2.5	2.0	3.8	7.1	0.5	(29)
(30)	—silage, marrow, HCl and H <sub>2</sub> PO <sub>4</sub> or A. I. V. acid added.....	13.6	1.2	8.7	6.4	2.2	1.6	3.1	6.3	0.4	(30)
(31)	—thousand head, very immature, fed green....	15.8	1.7	11.4	5.9	1.7	2.1	3.1	8.5	0.4	(31)
(32)	Kaliharigrass, mature, fed green.....	(26.0)	0.1	16.5	210.1	2.0	0.7	10.3	12.4	0.6	(32)
(33)	Kangaroo grass, mature, dry	(87.0)	0.1	37.4	357.3	11.5	2.7	29.2	42.1	1.5	(33)
(34)	—fed green.....	(17.5)	0.8	9.5	10.6	2.2	1.4	5.5	7.9	0.5	(34)
(35)	—very immature, fed green.....	(15.0)	0.9	8.4	8.4	1.9	1.4	4.5	6.7	0.5	(35)
(36)	—full bloom, fed green..	(20.0)	0.7	10.4	13.5	2.4	1.4	6.5	9.1	0.6	(36)
(37)	Kapok oil meal, 30% protein	87.0	27.2	56.6	1.1	6.4	30.6	20.0	22.8	7.2	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	26	84	6	15	82	3	28.4	44.0	9.4	33.8	25.1	26.2	5.5	( 1 )	
( 2 )	30	67	38	74	64	1	8.8	56.7	10.5	13.2	32.1	40.0	4.2	( 2 )	
( 3 )	48	66	45	58	51	7	2.8	49.5	9.2	4.2	34.2	50.8	1.6	( 3 )	
( 4 )	84	64	40	89	91	8	7.6	91.7	3.2	11.9	5.3	70.0	9.6	( 4 )	
( 5 )	33	30	18	41	47	9	6.4	35.2	5.5	21.3	24.4	41.9	6.9	( 5 )	
( 6 )	27	26	..	..	83	4	25.3	26.4	2.0	97.4	.....	.....	0.6	( 6 )	
( 7 )	52	47	41	64	57	1	4.4	49.1	7.0	9.3	41.7	40.8	1.2	( 7 )	
( 8 )	68	78	54	78	62	10	13.8	55.7	20.8	17.7	31.1	28.1	2.3	( 8 )	
( 9 )	59	25	-365	76	50	1	2.0	62.2	2.4	7.8	2.8	79.8	7.2	( 9 )	
(10)	71	15	82	94	22	10	0.8	87.1	1.3	5.4	7.9	84.4	1.0	(10)	
(11)	77	-8	87	74	60	3	-0.5	76.1	2.4	5.8	54.0	35.2	2.6	(11)	
(12)	90	84	75	98	75	3	28.4	89.7	3.3	33.8	9.8	50.4	2.7	(12)	
(13)	64	50	62	67	68	3	3.0	62.2	7.3	6.1	30.9	52.6	3.1	(13)	
(14)	62	57	59	64	60	1	4.2	58.5	8.6	7.4	31.1	50.0	2.9	(14)	
(15)	65	47	63	63	72	2	2.6	63.7	6.7	5.5	20.8	53.8	3.2	(15)	
(16)	90	44	68	57	47	8	3.5	54.8	9.6	8.0	32.1	48.6	1.7	(16)	
(17)	54	45	58	54	40	1	3.0	52.3	5.9	6.6	34.6	51.0	1.9	(17)	
(18)	81	72	60	90	57	1	6.8	73.8	10.4	9.5	19.7	58.3	2.1	(18)	
(19)	79	92	57	83	100	2	17.0	70.1	14.2	18.5	21.0	44.4	1.9	(19)	
(20)	82	82	69	88	58	28	13.7	71.7	15.0	16.7	17.4	48.0	2.9	(20)	
(21)	82	74	70	89	62	9	9.9	74.8	11.6	13.4	16.2	56.4	2.4	(21)	
(22)	81	80	64	89	56	4	11.8	71.4	14.4	14.7	18.4	49.3	3.2	(22)	
(23)	79	78	58	88	58	4	11.9	71.6	12.0	15.3	18.1	52.0	2.6	(23)	
(24)	85	88	74	87	68	2	19.4	74.2	15.8	22.1	11.5	47.2	3.4	(24)	
(25)	87	83	90	90	47	1	15.2	78.8	11.6	18.3	8.7	57.9	3.5	(25)	
(26)	78	70	51	88	69	3	6.3	72.3	8.8	9.0	19.4	61.5	1.3	(26)	
(27)	76	75	57	86	58	7	9.6	67.1	15.1	12.8	20.4	48.5	3.2	(27)	
(28)	85	84	78	89	72	1	14.9	76.2	15.1	17.7	17.6	44.8	4.8	(28)	
(29)	80	78	75	84	71	2	9.6	71.2	15.8	12.3	23.6	45.2	3.1	(29)	
(30)	76	75	62	84	33	4	8.6	63.9	16.3	11.5	23.1	46.3	2.8	(30)	
(31)	79	77	59	39	44	4	10.5	72.2	10.6	13.6	19.9	53.5	2.4	(31)	
(32)	62	11	72	66	56	2	0.3	63.3	7.5	2.7	39.7	47.8	2.3	(32)	
(33)	49	4	52	49	44	7	0.1	43.0	13.2	3.1	33.6	48.4	1.7	(33)	
(34)	61	57	62	60	46	4	4.7	54.3	12.3	8.2	31.3	45.1	3.1	(34)	
(35)	64	62	64	62	41	2	6.0	55.8	12.6	9.6	30.3	44.3	3.2	(35)	
(36)	57	52	59	57	50	2	3.6	52.1	12.0	6.9	32.3	45.8	3.0	(36)	
(37)	59	89	10	51	97	2	31.3	65.0	7.4	35.2	23.0	26.1	8.3	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Kapok oil meal, 40% protein.....	89.3	37.1	61.9	0.7	7.7	42.1	17.1	14.5	7.9	(1)
(2)	Karroobush, late bloom, dried.....	(87.0)	5.7	32.2	4.7	9.2	9.4	29.0	34.3	5.1	(2)
(3)	Lactic acid.....	89.4	.....	76.7	.....	0.1	.....	.....	89.3	.....	(3)
(4)	Leaves, alder, dry.....	85.0	8.8	41.7	3.8	5.0	18.7	14.4	41.8	5.1	(4)
(5)	—ash, dry.....	85.0	7.9	61.9	6.8	5.7	12.4	12.7	49.5	4.7	(5)
(6)	—asbestosbush, dry.....	85.3	2.0	27.4	12.2	22.0	7.2	13.8	40.3	2.0	(6)
(7)	—aspens, dry.....	85.0	9.2	44.8	3.9	7.7	14.6	20.3	37.3	4.6	(7)
(8)	—beech, dry.....	(86.0)	0.6	27.9	43.3	4.1	10.5	21.6	47.6	2.2	(8)
(9)	—black cherry, dry.....	76.1	6.8	45.4	5.6	3.1	11.8	17.2	41.3	2.7	(9)
(10)	—sycamore fig, fed green.....	29.5	0.7	12.1	16.0	4.5	4.0	4.2	16.2	0.6	(10)
(11)	—live oak, dry.....	93.8	0	16.8	.....	6.6	9.3	29.9	45.4	2.6	(11)
(12)	—black poplar, dry.....	85.4	12.8	52.5	3.1	5.9	16.1	20.1	40.6	2.7	(12)
(13)	—willow, dry.....	79.6	3.9	38.5	9.0	4.3	10.0	25.2	38.3	1.8	(13)
(14)	Leaves and twigs, popular, dry.....	86.7	6.2	55.0	7.8	7.7	11.2	17.9	41.0	8.9	(14)
(15)	Lemon pulp, dried.....	92.9	3.0	72.6	23.7	5.1	6.4	15.0	65.2	1.2	(15)
(16)	Lentil husks, common, dry.....	(87.0)	1.3	52.6	39.0	3.1	11.0	25.3	46.9	0.7	(16)
(17)	—seed.....	88.0	19.6	74.0	2.8	2.2	24.8	2.3	57.1	1.1	(17)
(18)	Leptotaenia fodder, carrot-leaf, dry.....	93.8	7.0	68.7	8.8	8.9	9.8	21.7	46.4	7.0	(18)
(19)	Linseed capsule chaff.....	89.7	5.8	39.9	5.9	9.2	9.5	33.5	31.7	5.8	(19)
(20)	—capsule chaff, molasses added, dry.....	81.1	6.1	49.0	7.1	9.4	9.5	14.9	45.1	2.2	(20)
(21)	—oil meal, old process, all expts.....	89.1	28.7	74.0	1.6	6.8	34.1	8.3	32.4	7.5	(21)
(22)	—oil meal, old process, under 8% fat.....	90.2	29.6	75.1	1.5	5.6	35.2	8.2	35.2	6.0	(22)
(23)	—oil meal, old process, 11% fat.....	86.0	26.6	72.2	1.7	9.5	31.3	8.4	25.5	11.3	(23)
(24)	—oil meal, old process, under 8% fiber.....	89.5	31.4	74.9	1.4	5.5	36.5	7.3	34.4	5.7	(24)
(25)	—oil meal, old process over 8% fiber.....	88.9	27.1	73.7	1.7	7.4	32.7	8.9	31.4	8.5	(25)
(26)	—oil meal, old process, 31% protein.....	87.6	27.2	72.5	1.7	7.7	31.7	8.4	31.0	8.8	(26)
(27)	—oil meal, old process, 34% protein.....	91.3	28.7	77.5	1.7	5.1	35.4	8.8	35.3	6.7	(27)
(28)	—oil meal, old process, 40% protein.....	91.2	33.0	74.9	1.3	5.4	40.3	7.3	33.6	4.6	(28)
(29)	—oil meal, solvent process.....	87.9	31.6	71.6	1.3	5.2	36.4	7.4	35.9	3.0	(29)
(30)	—oil meal, 15% urea added.....	92.6	66.7	81.6	0.2	4.8	71.7	7.6	4.5	4.0	(30)
(31)	Lovegrass hay, Lehmann.....	(87.0)	4.3	49.9	10.7	8.1	6.9	27.7	42.7	1.6	(31)
(32)	—hay, prebloom.....	(87.0)	6.2	52.0	7.5	7.6	9.0	27.8	41.1	1.5	(32)
(33)	—hay, mature.....	(87.0)	3.5	48.5	13.1	8.4	5.8	27.6	43.6	1.6	(33)
(34)	Lupine hay, all expts.....	86.1	12.4	55.5	3.5	7.5	18.0	26.0	31.7	2.9	(34)
(35)	—hay, late bloom.....	81.0	16.7	53.3	2.2	4.0	22.5	24.5	28.1	1.9	(35)
(36)	Lupine hay, little, full bloom, Nevada.....	93.5	9.4	54.2	4.8	18.3	12.4	22.7	36.1	4.0	(36)
(37)	Lupine hay, sweet.....	87.0	10.8	52.7	3.9	7.0	15.1	30.9	31.1	2.9	(37)
(38)	—hay, sweet, full bloom.....	85.7	11.3	52.2	3.6	6.2	14.1	33.2	30.6	1.6	(38)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	65	88	12	42	94	6	41.5	69.3	8.6	47.2	19.1	16.3	8.8	( 1 )	
( 2 )	38	60	13	50	49	4	6.5	37.0	10.6	10.8	33.3	39.4	5.9	( 2 )	
( 3 )	48	..	..	36	..	1	..	85.9	0.1	..	..	99.9	..	( 3 )	
( 4 )	50	47	7	70	24	8	10.3	49.1	5.9	22.0	17.0	49.1	6.0	( 4 )	
( 5 )	76	64	61	89	20	3	9.3	72.8	6.7	14.6	14.9	58.3	5.5	( 5 )	
( 6 )	41	29	23	51	35	2	2.4	32.1	25.8	8.4	16.2	47.2	2.4	( 6 )	
( 7 )	55	63	49	58	37	2	10.8	52.7	9.1	17.2	24.5	43.8	5.4	( 7 )	
( 8 )	33	6	26	42	33	2	0.7	32.4	4.8	12.2	25.1	55.4	2.5	( 8 )	
( 9 )	61	58	40	72	33	2	9.0	59.7	4.1	15.5	22.6	54.3	3.5	( 9 )	
(10)	46	18	32	57	59	1	2.4	41.0	15.4	13.4	14.3	54.8	2.1	(10)	
(11)	18	0	10	27	26	1	0	17.9	7.0	9.9	31.9	48.4	2.8	(11)	
(12)	63	80	32	72	65	2	15.0	61.5	6.9	18.8	23.5	47.6	3.2	(12)	
(13)	50	39	38	61	41	2	4.9	48.4	5.4	12.5	31.7	48.1	2.3	(13)	
(14)	58	56	35	65	79	2	7.2	63.5	8.9	12.9	20.7	47.2	10.3	(14)	
(15)	82	46	60	92	28	4	3.2	78.2	5.5	6.9	16.1	70.2	1.3	(15)	
(16)	61	12	67	70	96	1	1.5	60.5	3.6	12.6	29.1	53.9	0.8	(16)	
(17)	85	79	52	90	62	1	22.3	84.1	2.5	28.2	3.2	64.8	1.3	(17)	
(18)	72	71	47	83	82	2	7.5	73.2	9.5	10.5	23.1	49.4	7.5	(18)	
(19)	42	61	32	39	84	6	6.5	44.5	10.3	10.6	27.3	35.3	6.5	(19)	
(20)	66	64	28	78	72	4	7.5	60.4	11.6	11.7	18.4	55.6	2.7	(20)	
(21)	80	84	50	79	92	22	32.2	83.0	7.6	38.3	9.3	36.4	8.4	(21)	
(22)	81	84	46	83	93	16	32.8	83.3	6.2	39.0	9.1	39.0	6.7	(22)	
(23)	78	85	62	70	89	6	30.9	84.0	11.1	36.4	9.8	29.6	13.1	(23)	
(24)	82	86	41	83	93	8	35.1	83.7	6.2	40.8	8.2	38.4	6.4	(24)	
(25)	79	83	55	77	91	14	30.5	82.9	8.3	36.8	10.0	35.3	9.6	(25)	
(26)	79	86	53	75	89	13	31.1	82.8	8.8	36.2	9.6	35.4	10.0	(26)	
(27)	81	81	52	84	97	5	31.4	84.9	5.6	38.8	9.6	38.7	7.3	(27)	
(28)	82	82	38	87	95	4	36.2	82.1	5.9	44.2	8.0	36.9	5.0	(28)	
(29)	82	87	43	85	92	4	36.0	81.4	5.9	41.4	8.4	40.9	3.4	(29)	
(30)	87	93	80	3	97	2	72.0	88.1	5.2	77.4	8.2	4.9	4.3	(30)	
(31)	62	62	66	60	48	6	4.9	57.3	9.3	7.9	31.8	49.2	1.8	(31)	
(32)	65	63	70	61	40	2	7.1	59.8	8.7	10.4	31.9	47.3	1.7	(32)	
(33)	60	59	63	59	52	4	4.0	55.7	9.6	6.7	31.7	50.2	1.8	(33)	
(34)	68	69	67	70	52	10	14.4	64.5	8.7	20.9	30.2	36.8	3.4	(34)	
(35)	69	74	73	62	30	2	20.6	65.8	4.9	27.8	30.2	34.7	2.4	(35)	
(36)	68	75	56	75	57	2	10.0	58.0	19.6	13.3	24.3	38.5	4.3	(36)	
(37)	64	71	58	69	40	4	12.4	60.6	8.0	17.4	35.5	35.8	3.3	(37)	
(38)	65	80	57	68	32	1	13.2	60.9	7.2	16.5	38.7	35.7	1.9	(38)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Lupine hay, sweet, postbloom	85.7	9.9	46.5	3.7	6.3	13.8	36.8	27.3	1.5	(1)
(2)	—hay, sweet yellow.....	(87.0)	11.4	57.5	4.1	9.4	17.7	21.7	34.7	3.5	(2)
(3)	—hay, sweet, dehydrated...	92.2	13.1	58.9	3.5	10.9	19.0	26.9	32.3	3.1	(3)
(4)	—hay, sweet, early bloom, dehydrated.....	91.2	11.7	58.6	4.0	9.7	17.1	31.2	30.3	2.9	(4)
(5)	—hay, sweet yellow, dehydrated.....	89.8	12.3	59.2	3.8	9.6	18.6	24.1	34.2	3.3	(5)
(6)	—hay, sweet yellow, early bloom, dehydrated...	89.8	13.1	58.3	3.5	9.3	19.2	27.5	31.0	2.8	(6)
(7)	—pods, sweets, dry.....	89.7	10.6	77.4	6.3	2.8	14.1	40.2	30.8	1.8	(7)
(8)	—straw.....	88.3	2.4	47.8	19.3	3.0	6.2	42.9	35.1	1.1	(8)
(9)	—straw.....	81.5	2.1	31.0	13.7	2.1	4.6	46.9	26.8	1.1	(9)
(10)	—fodder, sweet, fed green	12.4	1.5	8.0	4.2	1.3	2.0	4.2	4.6	0.3	(10)
(11)	—fodder, sweet green, full bloom, fed green...	13.4	1.4	8.7	5.4	1.2	1.8	5.1	4.9	0.4	(11)
(12)	—fodder, sweet, late bloom, fed green...	10.4	1.1	6.8	5.0	1.4	1.5	3.4	3.8	0.3	(12)
(13)	—fodder, sweet, post-bloom, fed green...	14.2	1.8	9.5	4.3	0.8	2.3	5.3	5.5	0.3	(13)
(14)	—fodder, sweet, mature, fed green.....	17.8	2.4	11.5	3.8	1.2	3.0	6.9	6.2	0.5	(14)
(15)	—silage, all expts.....	18.4	1.9	10.5	4.7	2.0	2.7	6.7	6.4	0.6	(15)
(16)	—silage, all expts.....	15.2	2.7	10.5	2.9	0.5	3.5	5.7	4.8	0.7	(16)
(17)	—silage, full bloom.....	16.4	1.6	9.5	5.1	3.0	2.3	4.6	6.0	0.5	(17)
(18)	—silage, milk stage.....	16.8	1.2	8.8	6.1	1.8	2.3	6.7	5.5	0.5	(18)
(19)	—silage, bitter blue.....	15.2	2.7	10.5	2.9	0.5	3.5	5.6	4.9	0.7	(19)
(20)	—silage, bitter blue, full bloom.....	17.0	3.3	10.4	2.2	3.0	4.1	4.1	5.1	0.7	(20)
(21)	—silage, bitter white, full bloom.....	14.6	2.4	9.2	2.9	1.8	3.0	5.2	3.9	0.7	(21)
(22)	—silage, bitter yellow, full bloom.....	14.0	2.6	9.2	2.5	2.6	3.3	3.2	4.3	0.6	(22)
(23)	—silage, sweet.....	15.1	1.8	9.5	4.3	1.3	2.4	5.7	5.2	0.5	(23)
(24)	—silage, sweet, full bloom	11.7	1.2	7.7	5.6	1.0	1.7	4.3	4.3	0.4	(24)
(25)	—silage, sweet, dough stage.....	18.5	2.6	11.1	3.3	1.6	3.3	7.0	6.0	0.6	(25)
(26)	—silage, sweet blue, dough stage.....	23.9	2.6	13.1	4.0	2.1	3.5	9.0	8.8	0.5	(26)
(27)	—silage, sweet yellow, dough stage.....	21.5	3.0	13.5	3.6	2.0	3.7	7.6	7.5	0.7	(27)
(28)	—silage, sweet yellow, full bloom.....	11.8	1.9	7.7	3.0	2.0	2.5	3.8	3.0	0.5	(28)
(29)	—seed, all expts.....	89.8	33.0	80.5	1.4	3.6	37.5	16.2	28.2	4.3	(29)
(30)	—seed, bitter.....	84.2	30.3	78.8	1.6	3.4	33.3	13.8	29.2	4.5	(30)
(31)	—seed, bitterness extracted	86.5	31.0	76.7	1.5	2.7	35.6	17.3	27.1	3.8	(31)
(32)	—seed, sweet blue, low fiber	87.3	30.1	76.4	1.5	3.3	33.9	7.2	37.1	5.8	(32)
(33)	—seed, sweet blue, poor quality.....	89.3	26.3	75.8	1.9	4.0	31.0	16.2	34.3	3.8	(33)
(34)	—seed, sweet green.....	90.0	35.1	76.3	1.2	4.3	38.2	16.4	27.2	3.9	(34)
(35)	—seed, sweet green.....	90.0	36.6	85.0	1.3	4.3	38.2	16.4	27.2	3.9	(35)
(36)	—seed, sweet yellow.....	94.2	38.8	81.1	1.1	4.7	43.6	14.9	26.3	4.7	(36)
(37)	—bran, bitterness extracted	90.2	5.6	72.0	11.8	2.4	10.0	46.6	30.1	1.1	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	58	72	51	64	12	1	11.6	54.3	7.4	16.1	42.0	31.7	1.8	( 1 )	
( 2 )	70	64	72	72	71	2	13.1	66.1	10.8	20.4	24.9	39.9	4.0	( 2 )	
( 3 )	69	69	59	77	72	5	14.2	63.9	11.8	20.6	29.2	35.0	3.4	( 3 )	
( 4 )	69	68	61	77	69	3	12.8	64.2	10.6	18.8	34.2	33.2	3.2	( 4 )	
( 5 )	70	66	68	74	70	3	13.7	65.9	10.7	20.7	26.8	38.1	3.7	( 5 )	
( 6 )	69	68	61	78	69	1	14.6	64.9	10.4	21.4	30.6	34.5	3.1	( 6 )	
( 7 )	87	75	93	85	80	4	11.8	86.3	3.1	15.7	44.8	34.4	2.0	( 7 )	
( 8 )	55	38	51	65	30	2	2.7	54.1	3.4	7.0	48.6	39.8	1.2	( 8 )	
( 9 )	38	46	35	40	72	2	2.6	38.0	2.6	5.6	57.6	32.9	1.3	( 9 )	
(10)	71	76	64	76	47	18	12.3	64.5	10.8	16.2	33.8	36.6	2.6	(10)	
(11)	69	73	59	79	53	5	10.1	64.9	8.6	13.8	38.3	36.4	2.9	(11)	
(12)	73	74	65	82	54	4	11.0	65.4	13.2	14.8	32.8	36.6	2.6	(12)	
(13)	71	80	74	67	17	1	12.7	67.1	5.9	15.9	37.1	39.0	2.1	(13)	
(14)	68	81	63	69	41	1	13.4	64.8	6.5	16.6	38.5	35.8	2.6	(14)	
(15)	62	63	55	68	50	12	10.1	57.1	11.1	14.8	36.4	34.7	3.0	(15)	
(16)	67	77	52	75	77	9	17.7	68.9	3.0	23.0	27.2	32.5	4.3	(16)	
(17)	69	69	59	78	44	2	9.5	58.0	13.0	13.3	28.1	36.9	3.2	(17)	
(18)	57	55	55	61	49	4	7.4	52.6	11.0	13.4	39.9	32.7	3.0	(18)	
(19)	67	77	52	75	76	8	17.7	68.8	3.0	23.0	27.2	32.5	4.3	(19)	
(20)	70	79	49	79	76	2	19.3	61.4	17.5	24.4	24.4	29.8	3.9	(20)	
(21)	66	78	50	77	75	2	16.2	62.8	12.0	20.8	35.4	27.0	4.8	(21)	
(22)	75	80	59	84	80	1	18.6	65.6	18.6	23.3	22.6	31.5	4.0	(22)	
(23)	67	73	62	70	52	2	11.8	62.8	8.7	16.1	37.5	34.6	3.1	(23)	
(24)	70	69	67	75	51	1	10.0	65.9	8.7	14.5	36.9	36.8	3.1	(24)	
(25)	63	78	56	65	53	1	13.8	60.0	8.6	17.7	38.1	32.4	3.2	(25)	
(26)	59	74	45	67	47	2	11.0	54.8	8.7	14.8	37.6	36.7	2.2	(26)	
(27)	66	79	53	74	60	4	13.8	62.7	9.2	17.4	35.3	34.8	3.3	(27)	
(28)	73	78	64	82	77	2	16.5	65.4	16.6	21.2	32.4	25.8	4.0	(28)	
(29)	87	88	97	85	80	76	36.8	89.6	4.0	41.8	18.0	31.4	4.8	(29)	
(30)	92	91	99	90	84	4	36.0	93.6	4.0	39.6	16.4	34.6	5.4	(30)	
(31)	38	87	91	86	78	20	35.8	88.7	3.1	41.2	20.0	31.3	4.4	(31)	
(32)	84	89	98	77	81	1	34.5	87.5	3.8	38.8	8.2	42.5	6.7	(32)	
(33)	85	85	75	89	80	8	29.5	84.9	4.5	34.7	18.2	38.4	4.2	(33)	
(34)	85	92	70	85	75	1	39.0	84.8	4.8	42.4	18.2	30.3	4.3	(34)	
(35)	93	96	76	100	100	1	40.7	94.5	4.8	43.4	18.2	30.3	4.3	(35)	
(36)	35	39	33	80	84	13	41.2	86.1	5.0	46.3	15.8	27.9	5.0	(36)	
(37)	81	56	95	71	30	2	6.2	79.3	2.7	11.1	51.7	33.3	1.2	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Lupine flakes, bitterness extracted.....	90.5	32.8	89.0	1.7	1.5	37.2	7.5	39.2	5.1	(1)
(2)	Mallow hay, all expts.....	81.7	8.7	41.5	3.8	9.8	12.7	28.0	29.4	1.8	(2)
(3)	—hay, curly.....	81.3	11.8	45.1	2.8	10.6	15.1	23.2	31.0	1.4	(3)
(4)	—hay, smooth.....	78.9	6.2	41.4	5.7	9.0	9.1	29.6	29.3	1.9	(4)
(5)	—straw.....	87.9	3.5	35.5	9.0	8.6	5.8	43.2	29.7	0.6	(5)
(6)	—fed green, all expts.....	15.2	2.7	9.5	2.5	2.4	3.3	3.6	5.4	0.5	(6)
(7)	—1st cutting, fed green..	14.5	1.9	7.5	2.9	1.8	2.6	5.3	4.5	0.3	(7)
(8)	—2d cutting, fed green..	17.1	2.7	10.4	2.9	2.8	3.5	4.5	5.8	0.5	(8)
(9)	—curly, fed green.....	16.7	3.2	10.9	2.4	2.7	3.8	3.3	6.3	0.6	(9)
(10)	—curly, prebloom, fed green.....	15.4	3.1	10.7	2.4	2.6	3.6	2.7	6.0	0.5	(10)
(11)	—curly, full bloom, fed green.....	14.6	2.8	8.6	2.1	2.5	3.3	3.1	5.3	0.4	(11)
(12)	—curly, postbloom, fed green.....	29.2	3.2	23.4	6.2	3.2	3.8	8.2	12.3	1.7	(12)
(13)	—seed.....	91.6	16.7	69.2	3.2	6.2	21.6	23.4	25.2	15.2	(13)
(14)	—seed, roasted.....	94.9	17.3	74.6	3.3	6.2	22.7	22.3	27.4	16.3	(14)
(15)	—seed, oil meal, solvent process.....	92.2	20.7	51.9	1.5	11.0	26.1	23.8	28.7	2.6	(15)
(16)	Malt sprouts, low protein..	86.4	15.2	65.1	3.3	8.5	19.8	16.3	39.8	2.0	(16)
(17)	—sprout extract.....	53.3	15.0	37.0	1.5	8.3	21.4	.....	23.6	.....	(17)
(18)	Mangels, roots.....	11.0	0.6	9.4	15.8	1.1	0.8	0.8	8.3	0	(18)
(19)	—roots.....	13.5	0.7	10.9	14.4	1.1	1.1	0.9	10.3	0.1	(19)
(20)	—crowns and tops, fed green.....	12.6	1.8	8.2	3.7	2.4	2.1	1.4	6.2	0.5	(20)
(21)	—silage, roots.....	10.2	0.3	5.2	14.0	2.9	0.8	0.9	5.5	0.1	(21)
(22)	—crown and top silage..	12.8	1.2	7.2	5.1	2.8	1.8	1.9	5.7	0.6	(22)
(23)	—top silage.....	12.0	1.4	7.5	4.4	2.5	1.8	1.5	5.9	0.3	(23)
(24)	—top silage, wilted.....	13.6	1.5	7.6	4.1	2.8	2.2	2.1	5.8	0.7	(24)
(25)	Marabu pods, dry.....	90.2	3.6	52.5	13.6	4.9	9.7	24.0	50.3	1.3	(25)
(26)	Marsh hay, all expts.....	86.1	5.3	46.5	7.8	5.9	9.8	28.8	39.8	1.8	(26)
(27)	—hay, low fiber.....	84.7	5.4	48.0	7.8	6.4	9.9	26.0	40.5	1.9	(27)
(28)	—hay, high fiber.....	87.8	5.2	45.5	7.8	5.4	9.7	32.0	38.9	1.8	(28)
(29)	—hay, low protein.....	83.3	5.2	59.6	10.6	7.1	6.8	27.9	39.6	1.9	(29)
(30)	—hay, high protein.....	87.8	6.2	47.9	6.7	5.5	11.1	29.4	40.0	1.8	(30)
(31)	Meat scrap, beef.....	89.4	43.9	70.1	0.6	21.5	53.6	.....	2.3	12.0	(31)
(32)	Medic seed, black, ground..	86.4	7.3	43.9	5.1	6.7	14.4	22.7	40.7	1.9	(32)
(33)	Mellon's food by-product from barley, malt, wheat bran and flour.....	93.0	5.7	52.5	8.3	4.1	12.6	16.9	55.5	3.9	(33)
(34)	Mesquite bean, common.....	94.6	10.7	70.3	3.5	4.8	11.9	27.5	48.5	1.9	(34)
(35)	Milk, skimmed, gravity.....	9.5	3.3	8.8	1.6	0.7	3.6	.....	5.1	0.1	(35)
(36)	—skimmed, dried.....	93.1	30.6	79.9	1.6	8.0	34.1	.....	49.7	1.3	(36)
(37)	Milkvetch hay, Chinese.....	86.4	12.6	51.0	3.0	6.1	18.2	26.3	33.0	2.8	(37)
(38)	Millet hay.....	90.6	1.3	50.6	40.1	9.0	4.3	27.9	47.8	1.6	(38)
(39)	—hay, foxtail.....	81.9	5.3	52.2	8.8	7.0	8.8	23.9	39.1	3.1	(39)
(40)	—hulls.....	88.4	0.7	8.2	10.0	9.5	3.9	45.8	28.0	1.2	(40)
(41)	—fodder, foxtail, fed green	28.1	1.7	17.6	9.7	2.5	2.7	9.1	12.8	1.0	(41)
(42)	—fodder, foxtail, late bloom, fed green....	26.2	1.5	16.9	10.5	2.3	2.4	8.1	12.6	0.8	(42)
(43)	—grain.....	89.0	6.2	56.6	8.0	1.7	12.5	2.8	68.0	4.0	(43)
(44)	Molasses.....	72.1	-0.1	59.3	.....	6.3	2.8	.....	63.0	.....	(44)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. crude pro- tein	Total dig. nu- tri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
(1)	96	88	137	98	66	1	36.2	98.3	1.7	41.1	8.3	43.3	5.6	(1)	
(2)	56	69	48	55	78	12	10.7	50.8	12.0	15.5	34.3	36.0	2.2	(2)	
(3)	62	73	54	60	72	5	14.5	55.5	13.1	18.6	28.6	38.0	1.7	(3)	
(4)	57	68	52	56	81	3	7.8	52.5	11.4	11.5	37.5	37.2	2.4	(4)	
(5)	44	61	38	49	68	3	4.0	40.4	9.8	6.6	49.1	33.8	0.7	(5)	
(6)	72	82	52	78	71	21	17.8	62.7	16.0	21.7	24.0	35.2	3.1	(6)	
(7)	58	75	39	69	58	4	13.2	51.8	12.6	17.6	36.3	31.3	2.2	(7)	
(8)	70	78	53	80	64	3	15.8	61.0	16.6	20.3	26.2	34.1	2.8	(8)	
(9)	75	85	50	79	78	10	19.1	65.5	16.1	22.5	19.8	37.8	3.8	(9)	
(10)	79	85	62	84	75	2	20.1	69.2	16.8	23.7	17.8	38.2	3.5	(10)	
(11)	68	85	40	73	72	4	19.0	58.8	16.8	22.4	21.2	36.9	2.7	(11)	
(12)	82	85	73	86	93	2	11.0	80.0	11.0	13.0	28.2	41.9	5.9	(12)	
(13)	60	77	17	60	98	2	18.2	75.6	6.8	23.6	25.5	27.5	16.6	(13)	
(14)	60	76	19	61	99	3	18.2	78.6	6.5	23.9	23.5	28.9	17.2	(14)	
(15)	62	79	33	65	77	5	22.4	56.3	11.9	28.3	25.8	31.2	2.8	(15)	
(16)	83	77	83	83	73	9	17.6	75.4	9.8	22.9	18.9	46.1	2.3	(16)	
(17)	82	70	..	93	..	2	28.1	69.4	15.5	40.1	....	44.4	....	(17)	
(18)	94	73	76	99	50	1	5.1	85.8	9.9	7.0	6.9	75.3	0.4	(18)	
(19)	90	64	81	94	-84	23	5.2	81.1	8.4	8.2	6.6	76.2	0.6	(19)	
(20)	78	82	77	79	47	2	13.9	65.2	19.2	17.0	11.4	48.2	4.2	(20)	
(21)	70	45	39	79	40	1	3.4	50.7	28.3	7.5	8.8	54.0	1.4	(21)	
(22)	68	66	77	68	49	6	9.2	55.9	22.1	13.9	14.5	44.9	4.6	(22)	
(23)	78	76	71	83	28	1	11.6	62.6	20.9	15.2	12.1	49.0	2.8	(23)	
(24)	67	69	72	67	45	2	10.9	55.9	20.7	15.8	15.4	43.1	5.0	(24)	
(25)	61	37	55	67	69	2	4.0	58.2	5.4	10.8	26.6	55.8	1.4	(25)	
(26)	57	54	59	58	29	37	6.2	54.0	6.9	11.4	33.5	46.1	2.1	(26)	
(27)	60	55	63	61	35	19	6.4	56.7	7.6	11.7	30.7	47.7	2.3	(27)	
(28)	54	53	55	56	23	18	5.9	51.8	6.1	11.1	36.4	44.4	2.0	(28)	
(29)	57	75	76	76	75	10	6.2	71.6	8.5	8.2	33.5	47.5	2.3	(29)	
(30)	58	56	59	59	20	27	7.1	54.6	6.3	12.6	33.5	45.5	2.1	(30)	
(31)	73	82	..	..	97	3	49.1	78.4	24.0	59.9	....	2.7	13.4	(31)	
(32)	54	50	68	47	51	1	8.4	50.8	7.8	16.7	26.3	47.0	2.2	(32)	
(33)	55	45	44	58	83	2	6.1	56.5	4.4	13.5	18.2	59.7	4.2	(33)	
(34)	76	90	59	81	95	2	11.3	74.3	5.1	12.6	29.1	51.2	2.0	(34)	
(35)	101	94	..	101	110	3	35.2	92.4	7.8	37.5	....	53.4	1.3	(35)	
(36)	92	90	..	93	102	3	32.9	85.8	8.6	36.6	....	53.4	1.4	(36)	
(37)	60	69	43	69	68	2	14.6	59.0	7.1	21.1	30.4	38.1	3.3	(37)	
(38)	60	29	67	60	55	2	1.4	55.9	9.9	4.7	30.8	52.8	1.8	(38)	
(39)	66	60	68	67	64	2	6.5	63.7	8.6	10.8	29.2	47.6	3.8	(39)	
(40)	9	19	4	9	112	2	0.8	9.3	10.8	4.4	51.8	31.6	1.4	(40)	
(41)	66	61	67	67	59	12	5.9	62.8	8.9	9.6	32.5	45.5	3.5	(41)	
(42)	68	61	71	68	61	2	5.6	64.4	8.8	9.2	30.9	48.0	3.1	(42)	
(43)	61	50	38	65	56	2	7.0	63.6	1.9	14.1	3.1	76.4	4.5	(43)	
(44)	89	-3	..	94	..	6	-0.1	82.3	8.7	3.9	....	87.4	....	(44)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Molasses, very high protein...	72.6	5.7	55.0	8.7	6.6	11.1	.....	54.9	.....	(1)
(2)	—cane.....	73.7	-1.0	52.4	.....	5.9	3.5	.....	64.3	.....	(2)
(3)	—distillers' residue.....	7.1	1.6	4.9	2.1	1.5	2.1	.....	3.2	0.3	(3)
(4)	Molasses yeast mixture.....	50.6	9.3	38.8	3.2	5.9	13.7	.....	32.0	.....	(4)
(5)	Molassesgrass, fed green....	26.6	0.5	13.7	27.8	2.1	1.3	10.5	11.9	0.8	(5)
(6)	—full bloom, fed green....	31.6	0.2	16.0	89.4	2.5	1.0	12.1	15.2	0.8	(6)
(7)	—2d cutting, prebloom, fed green.....	35.0	0.2	16.3	95.9	2.4	1.0	14.1	16.7	0.8	(7)
(8)	Moorglass hay.....	87.3	9.6	54.8	4.7	4.7	13.4	22.9	44.3	2.0	(8)
(9)	Moorglass grass mixed hay	83.5	5.7	40.8	6.2	3.0	10.9	29.3	38.7	1.6	(9)
(10)	—mixed hay, overripe....	87.0	5.7	39.3	5.8	3.0	11.3	30.2	40.7	1.8	(10)
(11)	Mountainbush, bitter.....	92.6	10.2	75.3	6.4	4.4	12.4	14.9	57.8	3.1	(11)
(12)	Muhly hay, bush.....	93.3	0.2	30.1	145.8	16.4	5.1	27.9	42.3	1.6	(12)
(13)	Mustard seed oil meal.....	89.6	32.1	66.4	1.1	8.1	37.3	9.2	32.2	2.8	(13)
(14)	Napiergrass, fed green.....	23.0	1.2	12.6	9.7	2.3	1.9	7.8	10.3	0.7	(14)
(15)	—prebloom, fed green....	25.6	0.9	13.7	13.4	2.2	1.6	8.8	12.2	0.8	(15)
(16)	—late bloom, fed green....	23.0	0.8	11.3	12.7	1.2	1.8	9.0	10.8	0.2	(16)
(17)	—postbloom, fed green....	23.7	1.5	12.8	7.6	2.7	2.3	8.1	9.9	0.7	(17)
(18)	Napiergrass pigeonpea mixed fodder, fed green..	24.4	1.7	12.7	6.7	2.0	3.0	8.2	10.3	0.9	(18)
(19)	—mixed fodder, prebloom, fed green.....	25.3	1.6	12.9	7.0	2.0	3.1	8.4	10.8	1.0	(19)
(20)	—mixed fodder, full bloom, fed green....	21.8	1.9	10.6	4.6	2.0	3.0	7.1	8.8	0.9	(20)
(21)	—mixed fodder, milk stage, fed green.....	21.2	1.3	12.1	8.3	2.3	2.0	7.5	8.8	0.6	(21)
(22)	Nettle meal.....	92.5	3.7	32.1	7.6	5.6	6.8	45.5	33.9	0.7	(22)
(23)	Nigerseed oil meal.....	90.0	30.1	65.2	1.2	10.8	33.0	19.7	20.9	5.6	(23)
(24)	Oat hay.....	82.9	4.4	44.9	9.2	5.7	8.0	26.4	39.9	2.9	(24)
(25)	—hay, full bloom.....	73.5	4.0	38.4	8.7	5.6	7.3	27.0	31.8	1.8	(25)
(26)	—hay, milk stage.....	82.4	5.3	43.4	7.4	5.3	8.9	25.5	39.6	3.1	(26)
(27)	—hay, dough stage.....	84.6	3.7	46.2	11.5	5.5	7.1	26.0	43.0	3.0	(27)
(28)	—hay, mature.....	90.4	6.4	54.9	7.5	6.2	9.2	24.2	47.1	3.7	(28)
(29)	—chaff.....	89.0	0.6	33.0	49.2	8.7	4.1	26.3	48.6	1.3	(29)
(30)	—hulls.....	92.1	0.7	32.3	42.3	4.6	2.7	30.3	53.4	1.1	(30)
(31)	—by-products, clipped....	92.2	3.5	49.7	13.0	10.8	8.9	25.2	45.0	2.3	(31)
(32)	—mill feed.....	91.8	3.4	38.3	10.3	6.2	6.0	26.6	51.1	1.9	(32)
(33)	—mill feed.....	93.0	3.5	38.5	9.8	6.0	6.0	26.8	52.1	2.1	(33)
(34)	—straw.....	92.3	0.6	44.6	75.6	7.7	4.2	36.5	42.0	1.9	(34)
(35)	—straw.....	84.2	-0.3	37.2	.....	6.1	2.8	36.6	37.1	1.6	(35)
(36)	—straw, treated with Ca(OH) <sub>2</sub> .....	21.2	-0.6	12.0	.....	1.6	0.3	10.7	8.3	0.3	(36)
(37)	—straw, treated with NaOH	28.7	-0.7	19.9	.....	1.4	0.5	17.8	8.6	0.4	(37)
(38)	—fodder, fed green.....	25.1	2.1	15.3	6.2	2.1	2.9	7.4	11.5	1.2	(38)
(39)	—fodder, milk stage, fed green.....	28.0	2.0	16.6	7.3	2.2	2.8	8.6	13.1	1.3	(39)
(40)	—grain.....	94.0	9.3	75.3	7.1	3.4	11.9	10.8	62.4	5.5	(40)
(41)	—grain, all expts.....	87.7	8.9	66.1	6.4	3.3	11.4	10.6	57.2	5.2	(41)
(42)	—grain, heavy.....	89.0	11.1	72.3	5.5	2.7	12.6	8.9	59.6	5.2	(42)
(43)	—grain, light.....	89.4	9.8	65.3	5.7	3.2	11.8	12.9	57.4	4.1	(43)
(44)	—grain, white.....	89.3	8.0	69.1	7.6	2.9	10.3	9.6	61.3	5.2	(44)
(45)	—grain, white, heavy.....	88.8	10.2	70.5	5.9	2.5	12.2	9.8	59.6	4.7	(45)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	78	51	..	90	..	3	7.8	75.8	9.1	15.2	.....	75.6	.....	( 1 )	
( 2 )	78	-29	..	83	..	22	-1.4	71.1	8.0	4.7	.....	87.3	.....	( 2 )	
( 3 )	65	76	..	86	79	1	22.2	69.0	21.4	29.3	.....	44.6	4.7	( 3 )	
( 4 )	82	73	..	92	..	2	18.3	76.6	11.6	25.1	.....	63.3	.....	( 4 )	
( 5 )	54	38	60	51	46	11	1.8	51.5	7.8	4.7	39.3	45.3	2.9	( 5 )	
( 6 )	53	18	56	55	37	5	0.6	50.6	7.8	3.1	38.4	48.2	2.5	( 6 )	
( 7 )	50	16	52	48	44	9	0.5	46.5	7.0	3.0	40.2	47.4	2.4	( 7 )	
( 8 )	65	72	66	65	28	2	11.0	62.8	5.4	15.3	26.2	50.8	2.3	( 8 )	
( 9 )	47	52	57	39	94	10	6.8	48.9	3.6	13.0	35.1	46.4	1.9	( 9 )	
(10)	47	51	56	40	8	4	6.6	45.2	3.4	13.0	34.7	46.8	2.1	(10)	
(11)	82	82	70	86	71	2	11.0	81.3	4.7	13.4	16.1	62.4	3.4	(11)	
(12)	38	4	44	36	68	2	0.2	32.3	17.6	5.5	29.9	45.3	1.7	(12)	
(13)	78	86	53	74	89	2	35.8	74.1	9.0	41.6	10.3	36.0	3.1	(13)	
(14)	59	61	59	57	57	28	5.1	54.6	9.9	8.4	33.7	44.9	3.1	(14)	
(15)	58	58	57	55	61	14	3.7	53.6	8.6	6.4	34.5	47.5	3.0	(15)	
(16)	51	46	56	49	30	2	3.6	49.1	5.2	7.8	39.0	46.8	1.1	(16)	
(17)	59	65	59	57	56	12	6.2	54.0	11.4	9.6	34.2	41.8	3.0	(17)	
(18)	55	56	42	63	52	18	6.8	52.0	8.3	12.1	33.5	42.3	3.8	(18)	
(19)	54	52	41	63	48	6	6.4	51.1	7.8	12.3	33.4	42.6	3.9	(19)	
(20)	56	64	24	64	67	6	8.8	48.8	9.0	13.7	32.5	40.7	4.1	(20)	
(21)	62	67	64	59	58	6	6.2	57.3	10.8	9.2	35.3	41.7	3.0	(21)	
(22)	36	55	28	43	62	2	4.0	34.7	6.1	7.3	49.2	36.6	0.8	(22)	
(23)	76	91	42	72	92	4	33.4	72.4	12.0	36.7	21.9	23.2	6.2	(23)	
(24)	55	55	52	57	63	26	5.3	54.2	6.9	9.7	31.8	48.1	3.5	(24)	
(25)	54	54	60	51	48	4	5.4	52.2	7.6	9.9	36.7	43.3	2.5	(25)	
(26)	53	58	49	54	63	11	6.3	52.7	6.4	10.8	31.0	48.0	3.8	(26)	
(27)	55	52	49	59	64	6	4.4	54.6	6.5	8.4	30.7	50.8	3.6	(27)	
(28)	61	70	52	63	74	5	7.1	60.7	6.9	10.2	26.8	52.0	4.1	(28)	
(29)	40	16	..	43	42	2	0.7	37.1	9.8	4.6	29.6	54.5	1.5	(29)	
(30)	36	28	40	32	74	6	0.8	35.1	5.0	2.9	32.9	58.0	1.2	(30)	
(31)	59	40	58	62	70	6	3.8	53.9	11.7	9.6	27.2	48.9	2.5	(31)	
(32)	43	57	42	40	75	4	3.7	41.7	6.8	6.5	29.0	55.6	2.1	(32)	
(33)	42	59	34	42	83	12	3.8	41.4	6.4	6.5	28.8	56.0	2.2	(33)	
(34)	51	14	59	50	33	30	0.6	48.3	8.2	4.5	39.5	45.6	2.1	(34)	
(35)	47	-9	55	43	38	20	-0.3	44.2	7.3	3.3	43.4	44.1	1.9	(35)	
(36)	60	-170	81	42	56	8	-2.6	56.4	7.5	1.5	50.7	39.1	1.2	(36)	
(37)	72	-131	86	59	22	11	-2.4	69.2	5.0	1.8	62.0	29.8	1.4	(37)	
(38)	62	73	55	63	70	5	8.5	60.9	8.5	11.6	29.4	45.8	4.7	(38)	
(39)	60	71	51	62	69	3	7.2	59.4	7.7	10.1	30.7	47.0	4.5	(39)	
(40)	77	78	37	83	82	7	9.9	80.1	3.6	12.7	11.5	66.3	5.9	(40)	
(41)	73	78	32	78	80	69	10.1	75.4	3.8	13.0	12.1	65.2	5.9	(41)	
(42)	79	88	24	81	92	2	12.5	81.2	3.0	14.2	10.0	67.0	5.8	(42)	
(43)	70	83	53	70	92	2	11.0	73.0	3.6	13.2	14.4	64.2	4.6	(43)	
(44)	73	78	22	79	90	10	9.0	77.1	3.2	11.5	10.8	68.7	5.8	(44)	
(45)	75	84	25	81	90	1	11.5	79.4	2.8	13.7	11.0	67.2	5.3	(45)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Oats, grain, white, light . . . .	89.4	8.4	60.6	6.2	3.1	10.9	15.7	56.5	3.2	(1)
(2)	—grain, yellow . . . . .	87.1	10.3	69.7	5.8	3.0	11.9	8.9	58.2	5.1	(2)
(3)	—grain, yellow, heavy . . . .	89.2	11.9	73.8	5.2	2.9	13.0	8.1	59.7	5.5	(3)
(4)	—grain, yellow, light . . . .	89.4	11.2	69.8	5.2	3.2	12.7	10.0	58.5	5.0	(4)
(5)	—grain, under 5% fat . . . .	88.3	9.4	64.5	5.9	3.4	11.8	10.4	57.9	4.8	(5)
(6)	—grain, 5% fat . . . . .	87.0	8.4	65.9	6.9	3.1	11.0	11.0	56.2	5.7	(6)
(7)	—grain, under 9% fiber . . . .	89.1	8.7	68.5	6.8	3.1	11.2	8.9	60.9	4.9	(7)
(8)	—grain, 9-12% fiber . . . .	87.5	9.3	66.4	6.2	3.3	11.7	10.6	56.7	5.2	(8)
(9)	—grain, over 12% fiber . . . .	86.8	6.6	58.9	7.9	3.1	9.7	13.8	54.9	5.3	(9)
(10)	—grain, under 14.5% moisture . . . . .	88.6	9.1	66.4	6.3	1.6	11.9	10.8	59.1	5.2	(10)
(11)	—grain, tough, 14.5-16% moisture . . . . .	84.1	8.0	63.6	7.0	4.2	10.1	10.6	54.0	5.2	(11)
(12)	—grain, sample grade over 16% moisture . . . . .	82.1	9.3	64.0	5.9	3.6	11.2	10.7	51.3	5.3	(12)
(13)	—grain, under 10% protein . . . .	86.3	6.4	65.0	9.2	2.9	8.5	11.4	57.8	5.7	(13)
(14)	—grain, 10% protein . . . . .	87.8	7.7	65.4	7.5	3.2	10.7	10.9	57.6	5.4	(14)
(15)	—grain, 11% protein . . . . .	87.9	9.7	65.2	5.7	3.4	12.1	10.5	57.0	4.9	(15)
(16)	—milt or low grade . . . . .	91.5	8.0	72.7	8.2	3.8	11.2	16.9	55.0	4.6	(16)
(17)	—rolled . . . . .	91.0	14.4	92.7	5.5	1.8	15.9	1.9	65.5	5.9	(17)
(18)	—middlings . . . . .	91.1	12.9	88.7	5.9	2.4	16.1	2.4	63.3	6.9	(18)
(19)	—screenings . . . . .	89.4	11.4	73.3	5.5	2.7	12.9	8.0	60.1	5.7	(19)
(20)	—shorts . . . . .	93.0	7.1	59.1	7.3	5.5	10.4	20.6	50.9	5.6	(20)
(21)	—shorts . . . . .	92.7	10.3	60.7	4.9	5.2	13.3	13.3	54.8	6.1	(21)
(22)	Oat pea mixed hay . . . . .	84.5	8.6	50.1	4.8	7.1	12.1	27.5	35.4	2.4	(22)
(23)	—mixed hay, half bloom . . . .	94.6	7.2	59.4	7.3	7.6	10.7	33.1	41.0	2.2	(23)
(24)	—mixed hay, late bloom . . . .	91.4	6.9	51.5	6.5	6.9	10.4	32.2	39.8	2.1	(24)
(25)	—mixed hay, milk stage . . . .	82.4	9.1	49.1	4.4	7.1	12.4	26.4	34.0	2.5	(25)
(26)	—mixed fodder, fed green . . . .	24.5	2.9	15.3	4.2	2.0	3.8	7.2	10.3	1.2	(26)
(27)	—mixed fodder, milk stage, fed green . . . . .	27.1	2.8	16.3	4.8	2.0	3.8	8.9	11.3	1.1	(27)
(28)	—mixed silage . . . . .	26.5	1.9	16.4	7.8	2.6	3.1	8.3	11.5	1.0	(28)
(29)	—mixed silage, half bloom . . . .	21.7	2.1	12.6	5.0	2.1	3.0	7.0	8.5	1.1	(29)
(30)	—mixed silage, late bloom . . . .	25.1	2.3	14.7	5.5	2.1	3.2	7.4	11.3	1.1	(30)
(31)	—mixed silage, milk stage . . . .	26.2	2.5	17.6	6.0	2.0	3.3	8.8	10.5	1.6	(31)
(32)	Oat pea, sunflower vetch mixed fodder, fed green . . . . .	12.7	0.9	7.5	7.4	1.2	1.3	4.3	5.7	0.2	(32)
(33)	—mixed fodder, fed green . . . .	12.2	0.9	7.4	7.7	1.1	1.3	3.7	5.9	0.2	(33)
(34)	—mixed silage . . . . .	16.1	0.6	7.6	11.0	1.9	1.6	6.2	5.9	0.5	(34)
(35)	Oat pea vetch mixed fodder, dough stage, fed green . . . . .	28.0	2.0	15.7	6.9	1.9	3.4	9.6	12.5	0.6	(35)
(36)	—mixed silage, dough stage . . . . .	26.6	2.1	13.4	5.4	2.1	3.7	9.4	10.7	0.7	(36)
(37)	—mixed silage, high ash . . . .	11.6	1.7	5.7	2.3	4.3	2.3	2.3	2.2	0.5	(37)
(38)	Oat vetch mixed hay . . . . .	85.3	9.7	49.3	4.1	7.8	13.6	26.3	35.6	2.0	(38)
(39)	—mixed hay, late bloom . . . .	84.6	7.4	47.9	5.5	8.3	11.5	27.6	35.2	2.0	(39)
(40)	—mixed hay, postbloom . . . .	78.9	5.0	43.1	7.6	5.5	7.7	26.1	37.3	2.3	(40)
(41)	Oat light vetch mixed hay . . . .	89.5	2.0	49.2	23.6	10.2	5.9	32.5	39.6	1.3	(41)
(42)	Oat vetch mixed fodder, late bloom, fed green . . . . .	32.5	2.2	20.2	8.1	2.5	3.5	9.1	16.4	1.0	(42)
(43)	—mixed silage . . . . .	34.6	3.8	19.4	4.2	3.2	5.6	11.4	13.0	1.4	(43)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
(1)	67	77	51	67	89	1	9.1	67.8	3.5	12.2	17.6	63.1	3.6	(1)	
(2)	76	86	36	78	94	6	11.8	80.0	3.5	13.7	10.2	66.7	5.9	(2)	
(3)	78	91	23	81	94	1	13.3	82.7	3.2	14.6	9.1	66.9	6.2	(3)	
(4)	74	88	54	73	94	1	12.5	78.1	3.6	14.2	11.2	65.4	5.6	(4)	
(5)	73	79	16	78	78	41	10.6	73.1	3.8	13.4	11.8	65.6	5.4	(5)	
(6)	72	76	29	78	82	28	9.6	75.8	3.6	12.6	12.6	64.6	6.6	(6)	
(7)	73	78	26	78	90	11	9.8	76.9	3.5	12.6	10.0	68.4	5.5	(7)	
(8)	74	79	32	79	77	51	10.6	75.9	3.8	13.4	12.1	64.8	5.9	(8)	
(9)	64	68	38	68	82	6	7.6	67.9	3.6	11.2	15.9	63.2	6.1	(9)	
(10)	73	77	18	78	78	56	10.3	74.9	1.8	13.4	12.2	66.7	5.9	(10)	
(11)	72	79	40	76	88	7	9.5	75.6	5.0	12.0	12.6	64.2	6.2	(11)	
(12)	74	83	38	78	89	4	11.3	77.9	4.4	13.6	13.0	62.6	6.4	(12)	
(13)	70	75	28	75	94	6	7.4	75.3	3.4	9.8	13.2	67.0	6.6	(13)	
(14)	71	72	27	78	80	18	8.8	74.5	3.6	12.2	12.4	65.6	6.2	(14)	
(15)	74	80	18	79	78	45	11.0	74.2	3.9	13.8	11.9	64.8	5.6	(15)	
(16)	77	71	60	82	92	1	8.7	79.4	4.2	12.2	18.5	60.1	5.0	(16)	
(17)	96	90	80	93	96	2	15.8	101.9	2.0	17.5	2.1	71.9	6.5	(17)	
(18)	91	80	49	95	93	2	14.2	97.4	2.6	17.7	2.6	69.5	7.6	(18)	
(19)	77	88	18	81	92	2	12.7	82.0	3.0	14.4	9.0	67.2	6.4	(19)	
(20)	60	68	34	69	79	12	7.6	63.6	5.9	11.2	22.2	54.7	6.0	(20)	
(21)	65	77	27	63	90	2	11.1	65.5	5.6	14.4	14.4	59.0	6.6	(21)	
(22)	62	71	60	62	58	10	10.2	59.3	8.4	14.3	32.6	41.9	2.8	(22)	
(23)	67	67	68	66	54	1	7.6	62.8	8.0	11.3	35.0	43.4	2.3	(23)	
(24)	60	66	59	59	48	1	7.5	56.4	7.6	11.4	35.2	43.5	2.3	(24)	
(25)	62	73	59	62	60	8	11.0	59.6	8.6	15.1	32.0	41.3	3.0	(25)	
(26)	64	76	56	64	67	7	11.9	62.6	8.0	15.7	29.5	42.0	4.8	(26)	
(27)	62	74	56	62	63	4	10.4	60.3	7.4	14.0	32.9	41.7	4.0	(27)	
(28)	65	60	65	66	67	28	7.0	61.8	9.7	11.7	31.2	43.6	3.8	(28)	
(29)	59	70	61	54	71	1	9.7	58.4	9.8	13.9	32.4	39.0	4.9	(29)	
(30)	59	72	57	57	70	1	9.1	58.7	8.2	12.6	29.5	45.2	4.5	(30)	
(31)	67	75	61	67	75	2	9.5	67.0	7.8	12.7	33.4	40.0	6.1	(31)	
(32)	66	68	47	77	63	6	7.1	59.4	9.8	10.4	34.0	44.1	1.7	(32)	
(33)	66	67	49	76	64	4	7.0	61.0	9.4	10.4	30.6	47.7	1.9	(33)	
(34)	51	40	43	60	72	10	4.0	47.3	11.8	9.9	38.6	36.8	2.9	(34)	
(35)	60	58	59	62	24	1	7.1	56.0	6.9	12.2	34.3	44.4	2.2	(35)	
(36)	54	56	52	56	30	1	7.8	50.4	8.0	14.0	35.4	40.0	2.6	(36)	
(37)	74	76	82	63	62	2	15.0	49.3	37.1	19.8	19.8	19.0	4.3	(37)	
(38)	62	71	51	67	52	23	11.4	57.8	9.1	16.0	30.8	41.8	2.3	(38)	
(39)	62	64	62	63	28	4	8.7	56.6	9.8	13.6	32.6	41.6	2.4	(39)	
(40)	56	65	49	59	63	2	6.4	54.6	7.0	9.8	33.1	47.2	2.9	(40)	
(41)	62	34	62	66	32	6	2.2	55.0	11.4	6.6	36.3	44.3	1.4	(41)	
(42)	65	63	48	76	52	2	6.8	62.0	7.8	10.8	28.1	50.3	3.0	(42)	
(43)	56	67	50	57	79	2	10.9	56.1	9.2	16.2	33.0	37.4	4.2	(43)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Oat vetch mixed silage, late bloom.....	27.3	2.2	17.4	6.8	2.2	3.4	8.0	12.5	1.2	(1)
(2)	Oatgrass hay, tall.....	85.6	2.5	44.0	16.5	8.4	5.5	31.2	39.2	1.3	(2)
(3)	—hay, tall, full bloom....	85.9	2.4	43.4	16.9	8.8	5.5	32.2	38.0	1.4	(3)
(4)	—hay, tall, prebloom....	87.0	2.5	44.4	17.8	10.3	5.3	33.8	36.3	1.3	(4)
(5)	—hay, tall, mature.....	83.9	1.7	42.8	25.0	5.9	4.4	27.5	45.4	0.7	(5)
(6)	Oil.....	99.9	.....	98.8	.....	0.1	.....	.....	.....	99.8	(6)
(7)	Oil fungus ( <i>Endomyces ver-nalis</i> ).....	93.8	14.6	93.7	5.4	4.9	22.5	.....	38.5	27.9	(7)
(8)	Olive pulp meal.....	92.0	-0.6	28.6	.....	2.5	5.9	36.4	31.6	15.3	(8)
(9)	Orange culls.....	12.8	0.6	11.5	17.0	0.6	1.0	1.2	9.9	0.1	(9)
(10)	—pulp, dried.....	87.5	6.1	78.1	11.8	3.3	7.7	7.8	67.0	1.7	(10)
(11)	—pulp silage.....	15.9	0.6	13.0	20.9	0.8	1.2	2.6	11.0	0.3	(11)
(12)	—pulp silage.....	16.0	0.7	13.7	19.5	0.8	1.2	2.7	11.0	0.3	(12)
(13)	Orchardgrass hay.....	85.2	3.4	45.4	12.3	7.0	6.8	29.9	39.1	2.4	(13)
(14)	—hay, prebloom.....	84.1	3.8	47.3	12.5	6.7	7.1	29.4	38.4	2.5	(14)
(15)	—hay, early bloom.....	84.3	2.8	44.2	15.1	8.3	5.7	30.2	38.8	1.3	(15)
(16)	—hay, late bloom.....	89.0	4.4	48.1	10.1	6.2	7.5	33.0	39.3	3.0	(16)
(17)	—hay, mature.....	90.1	2.7	37.4	12.6	6.8	5.5	35.9	39.3	2.6	(17)
(18)	Orchardgrass ryegrass mixed hay.....	85.4	2.8	52.0	17.5	6.7	6.4	29.0	41.8	1.5	(18)
(19)	—mixed hay, late bloom.....	85.7	1.9	53.3	27.5	6.3	5.1	27.8	45.1	1.4	(19)
(20)	—mixed fodder, prebloom, fed green.....	19.4	1.8	13.0	6.2	1.4	2.5	5.4	9.6	0.5	(20)
(21)	—mixed silage, prebloom.....	21.0	2.1	14.3	5.9	1.7	2.8	6.7	9.0	0.8	(21)
(22)	Ossein.....	89.3	64.1	67.2	0	10.8	69.7	.....	7.1	1.7	(22)
(23)	Oxeyedaisy fodder, full bloom, dry.....	90.4	4.9	52.3	9.7	6.9	8.4	29.0	41.8	4.3	(23)
(24)	Painted cup fodder, scarlet, dry.....	93.3	6.2	61.1	9.0	12.5	9.4	21.2	45.4	4.8	(24)
(25)	Palm kernel oil meal, solvent process.....	89.1	13.1	68.7	4.2	3.8	17.3	14.1	53.5	0.4	(25)
(26)	—kernel oil meal, 2-5% fat.....	87.3	15.2	68.9	3.5	3.8	19.2	19.1	42.4	2.8	(26)
(27)	—kernel oil meal, 6-10% fat.....	88.1	13.4	72.9	4.4	3.7	17.4	15.0	44.1	7.9	(27)
(28)	—kernel meal, 16-25% fat.....	90.2	14.3	59.8	3.2	4.1	17.3	14.0	34.8	20.0	(28)
(29)	—kernel oil meal, high fiber.....	87.5	14.4	69.7	3.8	3.8	18.6	19.2	41.9	4.0	(29)
(30)	—kernel oil meal, low fiber.....	83.9	14.0	74.0	4.3	3.7	17.8	13.2	45.3	8.9	(30)
(31)	—kernel oil meal, doum-palm, high fiber, low protein.....	90.5	0.2	81.2	406.9	1.9	5.1	40.8	35.7	7.0	(31)
(32)	—kernel oil meal, molasses added.....	79.0	8.1	60.4	6.5	8.5	12.0	5.2	53.0	0.3	(32)
(33)	Panicum hay.....	93.1	4.4	47.3	9.9	4.9	8.4	32.0	46.0	1.8	(33)
(34)	Paragrass hay.....	91.6	0.4	41.1	127.4	6.9	3.2	33.9	46.7	0.9	(34)
(35)	—postbloom, fed green..	19.6	1.2	10.6	7.7	2.3	1.9	5.8	9.1	0.5	(35)
(36)	—1st cutting, prebloom, fed green.....	26.2	1.2	15.9	12.9	2.4	1.7	8.1	13.3	0.7	(36)
(37)	—2d cutting, full bloom, fed green.....	33.6	0.4	17.7	44.5	2.4	1.1	11.0	18.5	0.6	(37)
(38)	Paragrass pigeonpea mixed fodder, full bloom, fed green.....	21.4	1.6	10.7	5.8	1.9	2.5	6.8	9.6	0.6	(38)
(39)	Pea hay.....	89.6	8.8	54.6	5.2	5.4	12.4	32.3	38.0	1.5	(39)
(40)	—hay, dough stage.....	84.1	7.1	47.0	5.6	6.1	11.8	26.8	37.4	2.0	(40)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	66	65	57	70	73	2	8.2	63.9	8.1	12.6	29.4	45.6	4.3	( 1 )	
( 2 )	57	46	58	56	48	15	2.9	51.4	9.8	6.4	36.5	45.8	1.5	( 2 )	
( 3 )	56	44	66	48	49	3	2.8	50.5	10.3	6.4	37.5	44.2	1.6	( 3 )	
( 4 )	57	47	61	54	55	6	2.9	51.0	11.8	6.1	38.8	41.8	1.5	( 4 )	
( 5 )	54	37	44	62	60	3	2.0	51.0	7.0	5.3	32.8	54.1	0.8	( 5 )	
( 6 )	63	..	..	..	99	2	.....	98.9	0.1	.....	.....	.....	99.9	( 6 )	
( 7 )	75	65	..	75	80	1	15.6	99.9	5.2	24.0	.....	41.1	29.7	( 7 )	
( 8 )	17	-11	-20	20	86	5	-0.7	31.1	2.7	6.4	39.6	34.3	17.0	( 8 )	
( 9 )	94	64	82	99	44	1	5.0	90.0	4.7	7.8	9.4	77.3	0.8	( 9 )	
(10)	92	79	84	95	49	5	7.0	89.3	3.8	8.8	8.9	76.6	1.9	(10)	
(11)	84	50	72	92	65	1	3.8	82.0	5.0	7.5	16.4	69.2	1.9	(11)	
(12)	89	56	81	95	65	2	4.2	85.9	5.0	7.5	16.9	68.7	1.9	(12)	
(13)	56	50	60	56	40	15	4.0	53.3	8.2	8.0	35.1	45.9	2.8	(13)	
(14)	59	53	59	60	56	2	4.5	56.2	8.0	8.5	35.0	45.5	3.0	(14)	
(15)	57	48	65	53	40	4	3.3	52.4	9.8	6.8	35.8	45.8	1.8	(15)	
(16)	56	58	58	54	51	1	4.9	54.1	7.0	8.4	37.1	44.1	3.4	(16)	
(17)	41	50	42	35	99	2	3.0	41.5	7.6	6.1	39.9	43.5	2.9	(17)	
(18)	65	44	68	66	56	2	3.3	60.9	7.8	7.5	34.0	49.0	1.7	(18)	
(19)	66	37	68	68	57	1	2.2	62.2	7.3	5.9	32.4	52.8	1.6	(19)	
(20)	71	71	65	74	61	1	9.3	67.2	7.4	13.1	27.8	49.2	2.5	(20)	
(21)	71	73	75	70	54	1	9.9	68.2	8.1	13.5	31.8	48.0	3.6	(21)	
(22)	87	92	..	0	81	2	71.8	75.2	12.1	78.0	.....	8.0	1.9	(22)	
(23)	58	58	46	67	62	1	5.4	57.8	7.6	9.2	32.1	46.2	4.8	(23)	
(24)	70	65	49	80	77	2	6.6	55.5	13.4	10.1	22.7	48.7	5.1	(24)	
(25)	80	76	60	88	..	3	14.7	77.1	4.3	19.4	15.8	60.1	0.4	(25)	
(26)	80	79	47	92	92	11	17.4	78.9	4.4	22.0	21.9	48.5	3.2	(26)	
(27)	76	77	38	86	89	8	15.2	82.7	4.2	19.8	17.0	50.0	9.0	(27)	
(28)	85	82	73	89	94	3	15.9	66.3	4.5	19.2	15.5	38.6	22.2	(28)	
(29)	79	78	49	90	90	14	16.5	79.7	4.4	21.2	22.0	47.8	4.6	(29)	
(30)	80	79	49	88	68	11	15.8	83.2	4.2	20.0	14.9	50.9	10.0	(30)	
(31)	83	4	94	79	92	3	0.2	89.7	2.1	5.6	45.1	39.5	7.7	(31)	
(32)	87	67	58	91	167	1	10.2	76.5	10.8	15.2	6.6	67.0	0.4	(32)	
(33)	53	52	51	54	44	16	4.7	50.8	5.3	9.0	34.4	49.4	1.9	(33)	
(34)	48	10	53	47	45	3	0.4	44.9	7.5	3.5	37.0	51.0	1.0	(34)	
(35)	60	65	56	61	51	2	6.2	54.1	11.8	9.6	29.6	46.4	2.6	(35)	
(36)	70	66	64	65	61	3	4.4	60.6	9.1	6.6	31.0	50.8	2.5	(36)	
(37)	57	35	47	61	64	8	1.2	52.8	7.0	3.3	32.7	55.2	1.8	(37)	
(38)	55	62	41	60	49	1	7.4	50.2	9.1	11.9	31.6	44.5	2.9	(38)	
(39)	65	71	51	73	48	5	9.8	61.0	6.0	13.8	36.1	42.4	1.7	(39)	
(40)	59	60	52	64	46	2	8.4	55.9	7.3	14.0	31.9	44.4	2.4	(40)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Pea hay, overripe.....	93.2	11.2	61.4	4.5	5.8	14.4	28.6	43.0	1.4	(1)
(2)	—hulls or pods, dry.....	88.4	5.0	65.8	12.0	4.7	9.5	31.5	41.7	1.0	(2)
(3)	—straw.....	83.6	5.1	34.5	5.8	6.4	10.2	31.3	34.4	1.3	(3)
(4)	—straw.....	77.9	3.8	31.1	7.1	4.1	7.4	36.9	28.5	1.0	(4)
(5)	—straw, treated with NaOH, wet.....	21.7	0.1	10.7	.....	1.3	1.1	13.8	5.2	0.3	(5)
(6)	—vines, from canneries, dehydrated.....	85.8	5.9	51.8	7.8	7.7	10.0	22.3	43.5	2.3	(6)
(7)	—vines, from canneries, sun-cured.....	86.8	10.0	55.2	4.5	5.9	13.9	23.3	41.3	2.4	(7)
(8)	—fodder, fed green.....	12.4	2.4	8.1	2.4	2.0	2.9	3.1	3.9	0.5	(8)
(9)	—fodder, prebloom, fed green.....	13.5	3.0	9.0	2.0	1.4	3.7	3.0	4.8	0.6	(9)
(10)	—fodder, early bloom, fed green.....	12.2	2.3	8.0	2.5	2.1	2.7	3.2	3.7	0.5	(10)
(11)	—vine silage.....	23.0	1.8	13.4	6.6	1.7	3.0	7.4	10.1	0.8	(11)
(12)	—seed.....	85.7	20.6	74.6	2.6	2.6	23.9	4.0	53.9	1.3	(12)
(13)	—bran.....	92.2	7.4	65.7	7.9	2.9	11.0	44.4	32.3	1.6	(13)
(14)	—bran.....	(85.9)	0.7	71.9	101.0	2.7	4.7	46.3	31.9	0.3	(14)
(15)	Pea vetch mixed silage.....	10.0	1.4	6.2	3.5	1.4	1.8	4.6	1.5	0.7	(15)
(16)	Peanut hay, without nuts or with few nuts.....	92.3	6.0	58.0	8.6	10.0	9.2	24.1	46.0	3.0	(16)
(17)	—hay, without nuts or with few nuts (Goats).....	89.6	6.4	55.5	7.8	6.6	10.0	26.2	43.2	3.6	(17)
(18)	—hay, with nuts.....	90.7	10.1	70.7	6.0	7.6	13.2	22.3	35.0	12.6	(18)
(19)	—hulls with a few nuts.....	92.6	4.8	33.0	5.9	4.2	9.2	53.4	22.1	3.7	(19)
(20)	—tops, fed green.....	29.7	1.1	17.3	14.8	2.9	2.3	9.4	14.8	0.3	(20)
(21)	—kernels, hulls removed.....	95.2	23.6	116.9	3.9	2.5	28.5	4.0	13.3	46.9	(21)
(22)	—with hulls.....	92.0	15.1	99.0	5.6	3.0	19.1	21.7	13.8	34.4	(22)
(23)	—oil meal.....	87.2	39.2	82.1	1.1	4.9	43.2	4.6	26.6	7.9	(23)
(24)	—skins.....	94.6	4.4	67.8	14.3	3.3	17.8	8.0	37.8	27.7	(24)
(25)	Pearlmillet hay, late bloom (Goats).....	89.0	7.3	51.4	6.1	8.1	11.6	26.9	40.1	2.3	(25)
(26)	Peat.....	80.1	-0.7	-4.8	.....	5.8	6.2	30.8	35.5	1.8	(26)
(27)	—molasses added.....	69.2	2.8	42.7	14.2	7.3	6.9	6.9	48.1	.....	(27)
(28)	—treated with HCl.....	77.8	-1.1	21.3	.....	5.0	4.7	23.0	42.3	2.8	(28)
(29)	—treated with NaOH, molasses added.....	72.1	2.2	40.2	17.2	8.7	6.1	8.4	48.9	.....	(29)
(30)	Peavine hay ( <i>Lathyrus</i> spp.).....	87.5	14.9	53.2	2.6	6.6	19.1	24.1	35.2	2.5	(30)
(31)	—fodder, thickleaf, dry.....	93.1	4.5	46.4	9.4	7.4	9.3	27.7	44.7	4.0	(31)
(32)	—fodder, spring cut, fed green.....	25.3	2.9	15.4	4.3	3.7	3.9	7.9	9.1	0.7	(32)
(33)	—fodder, winter cut, fed green.....	10.5	1.6	5.7	2.5	3.3	2.0	2.3	2.5	0.4	(33)
(34)	—seed, grass.....	88.6	21.6	75.4	2.5	6.1	24.5	7.3	49.9	0.8	(34)
(35)	<i>Perilla</i> oil meal.....	90.9	33.4	61.3	0.8	8.2	37.5	20.1	16.4	8.7	(35)
(36)	<i>Phacelia</i> fodder, tansy, dry.....	85.4	5.8	30.5	4.3	9.7	10.3	26.7	37.2	1.5	(36)
(37)	—fodder, full bloom, fed green.....	15.2	1.7	6.6	2.9	2.9	2.7	3.1	6.1	0.4	(37)
(38)	—fodder, full bloom, fed green.....	10.9	1.1	5.3	3.9	1.8	1.7	3.8	3.4	0.2	(38)
(39)	—silage.....	12.1	1.2	6.8	4.7	2.1	1.8	3.3	4.5	0.4	(39)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
( 1 )	69	78	51	79	50	3	12.0	65.9	6.2	15.4	30.7	46.2	1.5	( 1 )	
( 2 )	79	53	79	83	57	8	5.7	74.4	5.3	10.8	35.6	47.2	1.1	( 2 )	
( 3 )	89	50	39	48	25	2	6.1	41.3	7.7	12.2	37.4	41.0	1.7	( 3 )	
( 4 )	42	52	38	43	43	7	4.9	39.9	5.3	9.5	47.4	36.5	1.3	( 4 )	
( 5 )	52	-7	54	59	46	7	-0.4	49.5	5.9	5.1	63.6	24.2	1.2	( 5 )	
( 6 )	65	59	51	73	55	6	6.9	60.4	9.0	11.7	26.0	50.6	2.7	( 6 )	
( 7 )	67	72	52	73	54	6	11.5	63.6	6.8	16.0	26.9	47.5	2.8	( 7 )	
( 8 )	74	84	62	80	58	14	19.5	65.4	16.2	23.2	25.4	31.2	4.0	( 8 )	
( 9 )	71	82	62	71	52	2	22.5	66.7	10.4	27.4	22.2	35.6	4.4	( 9 )	
(10)	75	84	62	82	59	12	18.8	65.3	17.1	22.4	25.9	30.6	4.0	(10)	
(11)	61	59	50	68	58	12	7.7	58.1	7.4	13.0	32.2	44.1	3.3	(11)	
(12)	89	86	50	93	64	6	24.0	87.0	3.0	27.9	4.7	62.9	1.5	(12)	
(13)	72	67	69	77	79	7	8.0	71.3	3.1	11.9	48.2	35.1	1.7	(13)	
(14)	86	15	96	82	86	2	0.8	83.7	3.2	5.5	53.9	37.0	0.4	(14)	
(15)	65	75	56	83	72	4	13.8	62.4	14.4	18.4	45.8	14.8	6.6	(15)	
(16)	68	65	51	77	62	7	6.5	62.8	10.8	10.0	26.1	49.8	3.3	(16)	
(17)	63	63	52	70	66	2	7.1	61.9	7.4	11.2	29.2	48.2	4.0	(17)	
(18)	63	76	48	68	92	6	11.1	77.9	8.4	14.6	24.6	38.5	13.9	(18)	
(19)	35	52	16	57	84	12	5.2	35.6	4.5	9.9	57.7	23.9	4.0	(19)	
(20)	64	47	40	79	31	2	3.7	58.1	9.9	7.8	31.7	49.6	1.0	(20)	
(21)	70	83	39	-17	89	2	24.8	122.8	2.6	29.9	4.2	14.0	49.3	(21)	
(22)	65	79	25	19	98	2	16.4	107.6	3.3	20.8	23.6	14.9	37.4	(22)	
(23)	89	91	56	90	91	13	45.0	94.1	5.6	49.5	5.3	30.5	9.1	(23)	
(24)	39	25	..	16	92	2	4.7	71.7	3.5	18.8	8.5	39.9	29.3	(24)	
(25)	62	63	67	59	46	2	8.2	57.8	9.1	13.0	30.2	45.1	2.6	(25)	
(26)	-2	-12	-23	3	48	14	-0.9	-6.0	7.2	7.8	38.4	44.3	2.3	(26)	
(27)	68	41	-22	86	..	5	4.1	61.7	10.5	9.9	10.0	69.6	..	(27)	
(28)	28	-23	32	33	18	4	-1.4	27.4	6.4	6.1	29.5	54.4	3.6	(28)	
(29)	62	36	-2	78	..	8	3.1	55.8	12.0	8.5	11.6	67.9	..	(29)	
(30)	64	78	44	70	53	7	17.0	60.8	7.5	21.8	27.5	40.3	2.9	(30)	
(31)	52	48	36	65	32	1	4.8	49.9	7.9	10.0	29.7	48.1	4.3	(31)	
(32)	69	74	55	81	48	4	11.4	60.7	14.6	15.4	31.4	35.9	2.7	(32)	
(33)	75	79	63	88	52	6	15.3	53.9	31.8	19.4	22.2	22.6	4.0	(33)	
(34)	90	88	83	92	106	8	24.4	85.1	6.9	27.7	8.2	56.3	0.9	(34)	
(35)	62	89	18	38	92	8	36.8	67.4	9.0	41.3	22.1	18.0	9.6	(35)	
(36)	39	56	19	48	52	2	6.8	35.7	11.4	12.1	31.3	43.4	1.8	(36)	
(37)	52	62	27	61	44	2	11.2	43.6	19.1	18.0	20.4	39.8	2.7	(37)	
(38)	56	66	56	54	49	2	10.1	49.0	16.1	15.3	35.0	31.5	2.1	(38)	
(39)	64	67	54	70	70	12	9.8	56.3	17.2	14.7	27.4	37.1	3.6	(39)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	<i>Phacelia silage, full bloom</i> ...	11.7	1.2	6.8	4.8	2.1	1.8	3.1	4.2	0.5	(1)
(2)	<i>Pigeonpea fodder, prebloom, fed green</i> .....	25.2	3.2	14.6	3.7	1.5	5.1	7.7	9.5	1.4	(2)
(3)	<i>Pineapple pulp, dried</i> .....	83.6	0.8	59.9	75.2	3.4	3.8	13.9	61.8	0.7	(3)
(4)	<i>Poppy seed oil meal</i> .....	89.3	29.8	58.7	1.0	12.0	35.5	12.7	22.8	6.3	(4)
(5)	<i>Postum by-product from molasses, roasted wheat, and wheat bran</i> .....	90.8	3.5	42.4	10.9	2.5	17.8	16.4	51.3	2.8	(5)
(6)	<i>Potato seedballs, dry</i> .....	92.3	5.4	42.8	7.0	8.4	16.2	21.7	38.9	7.1	(6)
(7)	—tops with seedballs, dry	82.6	5.7	40.9	6.2	10.2	11.4	26.0	30.7	4.3	(7)
(8)	—tops, dry	87.2	5.6	45.2	7.0	15.8	10.8	22.6	35.6	2.4	(8)
(9)	—tubers	24.6	1.4	20.7	13.8	0.9	2.2	0.5	20.9	0.1	(9)
(10)	—cooked	24.6	1.1	18.0	14.9	0.9	2.6	0.7	20.3	0.1	(10)
(11)	—peelings (Goats)	24.8	1.1	18.4	16.0	2.3	2.7	1.5	18.2	0.1	(11)
(12)	—silage	23.2	1.0	19.3	17.8	1.3	1.7	0.7	19.4	0.1	(12)
(13)	—silage	23.2	0.8	18.8	21.9	1.3	1.7	0.7	19.4	0.1	(13)
(14)	—silage, steamed	28.5	1.3	23.3	16.7	2.9	2.5	1.0	22.1	0	(14)
(15)	—top silage	16.5	1.8	9.4	4.1	3.2	2.6	3.8	6.3	0.6	(15)
(16)	—top silage, sugar added	17.3	1.0	6.3	5.0	5.1	2.2	4.5	5.0	0.5	(16)
(17)	—flakes or flour	85.9	2.5	63.7	24.6	3.5	7.3	2.0	72.8	0.3	(17)
(18)	—flakes, 15% urea added	94.1	46.2	82.2	0.8	4.0	50.2	2.1	37.4	0.4	(18)
(19)	—pulp, raw, pressed, dried	85.2	-0.8	69.2	.....	2.3	3.4	5.0	74.3	0.2	(19)
(20)	<i>Potato spent residue, dried</i>	88.3	14.3	58.0	3.1	12.0	22.7	6.3	46.7	0.6	(20)
(21)	<i>Potatoes and mineral yeast, dried</i> .....	92.5	32.4	78.3	1.4	8.8	39.5	6.7	36.8	0.7	(21)
(22)	<i>Potato spent residue and starch, dried</i> .....	82.4	1.8	66.4	35.0	3.9	6.8	1.9	69.6	0.2	(22)
(23)	<i>Proso, grain</i> .....	90.7	6.8	73.5	9.8	2.4	10.4	8.3	65.3	4.3	(23)
(24)	<i>Prunes, dried, ground</i> .....	85.3	0.6	56.7	88.8	4.0	4.9	10.2	64.2	2.0	(24)
(25)	<i>Pumpkins, entire</i> .....	12.6	1.5	11.4	6.5	1.0	2.0	1.9	6.2	1.5	(25)
(26)	—seeds removed	5.4	0.7	5.4	6.8	0.5	0.7	0.9	3.2	0.1	(26)
(27)	<i>Pumpkin seed hulls</i> .....	89.8	6.5	24.2	2.7	2.5	17.1	64.7	0.2	5.3	(27)
(28)	—seed meal	91.4	38.0	88.2	1.3	7.4	45.2	12.7	9.4	16.7	(28)
(29)	—seed oil meal, solvent process	89.5	34.1	55.3	0.6	7.6	42.1	30.5	8.1	1.2	(29)
(30)	<i>Quackgrass hay, full bloom</i>	92.1	4.4	57.5	12.0	5.1	7.7	30.6	45.8	2.9	(30)
(31)	—meal	94.0	3.4	41.8	11.4	8.3	7.5	29.2	48.3	0.7	(31)
(32)	<i>Radish, oilseed, serradella mixed silage</i> .....	30.2	2.7	15.1	4.5	2.2	4.3	11.7	10.6	1.4	(32)
(33)	<i>Radish, oilseed, vetch mixed silage</i> .....	17.6	2.0	9.6	3.8	2.1	3.0	5.0	6.8	0.7	(33)
(34)	<i>Raisin pulp, dry</i> .....	88.7	2.3	50.9	21.1	3.7	9.6	19.3	45.6	10.5	(34)
(35)	<i>Rape, early bloom, dehydrated</i> .....	82.5	6.6	53.5	7.2	10.1	11.1	18.8	40.4	2.1	(35)
(36)	—seed pod meal	88.7	5.1	50.6	10.0	14.0	9.8	22.9	34.5	7.5	(36)
(37)	—straw	79.7	0.6	23.1	33.5	3.4	2.8	43.7	28.9	0.9	(37)
(38)	—straw, treated with NaOH, wet	25.7	-0.3	10.6	.....	1.4	1.0	16.0	7.0	0.3	(38)
(39)	—fed green	17.4	2.5	13.9	4.6	2.0	3.0	2.3	9.4	0.7	(39)
(40)	—very immature, fed green	18.5	2.5	15.0	5.1	2.1	3.0	2.4	10.3	0.7	(40)
(41)	—early bloom, fed green	11.3	2.3	8.5	2.7	1.6	2.7	1.8	4.8	0.4	(41)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract			
( 1 )	66	66	58	73	69	8	10.0	58.2	17.8	15.2	28.7	36.3	4.0	( 1 )		
( 2 )	58	62	38	69	61	11	12.5	58.0	5.8	20.1	30.7	37.7	5.7	( 2 )		
( 3 )	74	21	70	80	-7	4	0.9	71.6	4.1	4.5	16.6	74.0	0.8	( 3 )		
( 4 )	65	84	28	52	94	12	33.4	65.7	13.4	39.8	14.2	25.5	7.1	( 4 )		
( 5 )	45	20	13	62	78	2	3.9	46.7	2.7	19.6	18.1	56.5	3.1	( 5 )		
( 6 )	44	33	26	54	68	2	5.8	46.4	9.1	17.6	23.5	42.1	7.7	( 6 )		
( 7 )	53	50	60	49	47	1	6.9	49.5	12.4	13.8	31.5	37.1	5.2	( 7 )		
( 8 )	61	52	61	64	54	12	6.4	51.8	18.1	12.4	25.9	40.8	2.8	( 8 )		
( 9 )	87	63	-53	93	55	8	5.7	84.0	3.6	9.0	2.1	84.9	0.4	( 9 )		
(10)	81	43	-257	92	-43	1	4.6	73.1	3.6	10.7	2.8	82.6	0.3	(10)		
(11)	81	40	14	93	39	2	4.4	74.0	9.2	10.9	5.9	73.5	0.5	(11)		
(12)	88	60	36	93	12	1	4.4	83.3	5.6	7.4	3.2	83.4	0.4	(12)		
(13)	84	48	-6	92	116	2	3.6	81.1	5.6	7.4	3.2	83.4	0.4	(13)		
(14)	90	53	62	96	81	2	4.6	81.7	10.1	8.7	3.4	77.5	0.3	(14)		
(15)	68	72	53	74	63	10	11.2	57.2	19.1	15.6	23.0	38.6	3.7	(15)		
(16)	48	48	44	52	58	2	6.0	36.3	29.4	12.6	26.0	29.2	2.8	(16)		
(17)	85	34	-72	86	-10	31	2.9	74.1	4.1	8.5	2.3	84.8	0.3	(17)		
(18)	91	92	50	93	16	2	49.1	87.4	4.2	53.4	2.2	39.8	0.4	(18)		
(19)	84	-23	5	93	156	4	-0.9	81.2	2.7	4.0	5.9	87.2	0.2	(19)		
(20)	74	63	45	88	-15	5	16.2	65.7	13.6	25.7	7.1	52.9	0.7	(20)		
(21)	93	82	142	97	42	2	35.0	84.6	9.5	42.7	7.2	39.7	0.9	(21)		
(22)	86	27	-130	96	47	2	2.2	80.6	4.7	8.3	2.3	84.5	0.2	(22)		
(23)	78	65	14	88	84	12	7.5	81.0	2.7	11.5	9.1	72.0	4.7	(23)		
(24)	67	13	0	82	77	3	0.7	66.5	4.7	5.7	12.0	75.3	2.3	(24)		
(25)	83	77	61	89	92	7	12.1	90.5	7.7	15.7	14.9	49.5	12.2	(25)		
(26)	106	93	116	106	93	2	12.7	99.3	8.8	13.7	17.3	57.6	2.6	(26)		
(27)	22	38	13	40	77	1	7.2	26.9	2.8	19.0	72.0	0.3	5.9	(27)		
(28)	80	84	61	68	96	5	41.6	96.5	8.1	49.5	13.9	10.2	18.3	(28)		
(29)	67	81	40	96	48	2	38.1	61.8	8.5	47.0	34.1	9.1	1.3	(29)		
(30)	63	57	61	67	56	3	4.8	62.4	5.5	8.4	32.2	49.7	3.2	(30)		
(31)	49	45	27	63	5	1	3.6	44.5	8.8	8.0	31.1	51.4	0.7	(31)		
(32)	50	64	34	63	54	1	9.0	50.0	7.4	14.1	38.8	35.0	4.7	(32)		
(33)	58	67	40	68	58	1	11.3	54.3	11.8	16.8	28.3	39.2	3.9	(33)		
(34)	46	24	19	52	90	5	2.6	57.4	4.2	10.8	21.8	51.4	11.8	(34)		
(35)	72	59	56	83	61	1	8.0	64.9	12.2	13.5	22.8	48.9	2.6	(35)		
(36)	57	52	55	53	86	1	5.7	57.0	15.8	11.0	25.3	38.9	8.5	(36)		
(37)	30	24	25	38	25	6	0.8	29.0	4.3	3.5	54.8	36.3	1.1	(37)		
(38)	44	-36	44	51	41	10	-1.3	41.2	5.5	3.7	62.1	27.4	1.3	(38)		
(39)	88	82	87	93	50	13	14.4	80.0	11.8	17.5	13.4	53.4	3.9	(39)		
(40)	89	81	89	94	49	11	13.3	81.2	11.4	16.4	13.0	55.2	4.0	(40)		
(41)	84	86	77	88	56	2	20.2	74.9	14.0	23.5	15.8	42.9	3.8	(41)		

TABLE 2—COMPOSITION OF FEEDING STUFFS

		DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									
Row No.	FEEDING STUFF	Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	Row No.
		%	%	%	1:	%	%	%	%	%	
(1)	Rape silage, winter, early bloom.....	13.0	2.1	8.4	3.1	1.9	2.8	2.5	4.9	0.9	(1)
(2)	—seed.....	88.0	30.9	67.7	1.2	7.3	35.5	13.7	25.5	6.0	(2)
(3)	—seed oil meal.....	88.7	28.5	63.3	1.2	7.4	34.7	9.7	30.3	6.6	(3)
(4)	Redtop hay, full bloom....	90.7	5.3	55.8	9.5	4.3	8.5	26.8	47.7	3.4	(4)
(5)	Redtop timothy mixed hay.	88.5	2.2	47.8	20.9	5.7	5.6	28.9	46.4	1.9	(5)
(6)	—mixed, hay, late bloom.	88.0	2.1	47.6	21.4	5.6	5.5	28.8	46.3	1.8	(6)
(7)	Reed silage.....	25.0	1.2	12.0	9.3	2.9	2.3	11.0	7.9	0.9	(7)
(8)	Reedgrass hay, bluejoint...	92.6	6.2	54.1	7.7	5.4	9.4	33.6	41.7	2.5	(8)
(9)	—hay, full bloom.....	93.2	6.6	62.9	8.4	5.3	9.5	33.8	42.3	2.3	(9)
(10)	Reindeermoss, old, dry.....	91.4	-1.7	28.8	.....	1.4	4.3	32.8	50.3	2.6	(10)
(11)	—young, dry.....	80.8	-0.1	19.7	.....	1.0	4.4	26.6	47.1	1.7	(11)
(12)	Rhodesgrass hay.....	92.4	2.6	54.1	20.0	7.9	5.7	33.1	43.9	1.8	(12)
(13)	—hay, mature.....	92.8	2.4	50.9	20.1	10.5	5.5	32.1	43.0	1.7	(13)
(14)	—early bloom, fed green.	(28.8)	1.6	19.0	11.1	1.7	2.5	10.9	13.3	0.4	(14)
(15)	Rhodesgrass Guineagrass grass mixed hay.....	91.7	3.2	47.6	13.8	10.4	6.4	33.3	39.3	2.3	(15)
(16)	—mixed hay, prebloom..	90.0	5.2	53.1	9.1	10.2	8.5	33.3	35.7	2.3	(16)
(17)	—mixed hay, half bloom.	92.5	4.3	50.1	10.7	10.5	7.4	31.9	40.5	2.2	(17)
(18)	—mixed hay, mature.....	92.0	3.1	47.5	14.3	10.5	6.1	32.8	40.2	2.4	(18)
(19)	—mixed hay, overripe....	91.5	1.7	41.3	22.7	10.2	4.6	34.1	40.6	2.0	(19)
(20)	Rice hay, dough stage.....	93.0	2.1	38.9	17.0	15.1	5.7	31.0	39.8	1.4	(20)
(21)	—bran and hulls.....	91.2	3.1	33.4	9.8	15.0	6.7	25.4	39.6	4.5	(21)
(22)	—hulls.....	93.0	0.2	15.1	72.8	16.1	2.9	41.9	30.7	1.4	(22)
(23)	—straw.....	89.6	1.4	35.6	23.2	16.2	4.7	34.3	32.9	1.5	(23)
(24)	—straw.....	88.0	2.4	36.8	14.6	17.7	5.5	31.0	32.1	1.7	(24)
(25)	—straw, boiled in water..	91.7	2.0	40.3	18.8	17.4	5.5	33.5	33.6	1.7	(25)
(26)	—straw, treated with Ca-(OH) <sub>2</sub> , dry.....	91.2	0	51.4	.....	19.2	4.4	39.7	26.3	1.6	(26)
(27)	—straw, treated with Na-OH, dry.....	91.4	1.1	50.5	45.8	14.3	5.4	36.6	33.6	1.5	(27)
(28)	—grain, rough.....	89.5	6.4	72.0	10.4	4.0	8.3	8.3	67.6	1.3	(28)
(29)	—bran.....	90.6	8.5	68.5	7.1	10.1	12.5	12.9	43.0	12.1	(29)
(30)	—feed.....	89.9	7.2	68.9	8.6	9.9	12.3	7.2	45.5	15.0	(30)
(31)	—polishings.....	91.8	11.0	85.4	6.7	6.0	14.1	4.1	54.8	12.8	(31)
(32)	Rocketsalad, dried.....	88.3	9.4	54.0	4.7	9.3	12.0	29.1	35.9	2.0	(32)
(33)	—fed green.....	15.8	1.0	9.5	8.2	1.5	1.8	5.8	6.4	0.3	(33)
(34)	—silage.....	14.2	2.1	10.1	3.9	2.5	2.5	2.6	6.0	0.6	(34)
(35)	Rockweed, dry.....	87.7	4.7	30.5	5.5	20.1	14.2	7.4	43.7	2.3	(35)
(36)	Rubber seed oil meal, hydraulic process.....	90.7	27.1	106.1	2.9	4.6	29.8	3.2	32.9	20.1	(36)
(37)	Rush hay, saltmeadow....	84.0	3.9	41.3	9.5	6.6	7.3	24.1	43.9	2.1	(37)
(38)	Rush, Baltic, grass mixed hay.....	92.9	4.6	56.9	11.5	6.4	7.7	28.9	47.8	2.1	(38)
(39)	Rush, slenderbreak, sedge grass legume mixed hay.....	94.2	2.9	53.7	17.5	7.0	6.6	34.0	44.0	2.6	(39)
(40)	Russianthistle, tumbling, dry	85.6	7.5	38.5	4.1	10.4	11.5	27.0	34.1	2.6	(40)
(41)	Rumen contents, dried.....	78.8	10.6	45.5	3.3	10.5	15.8	12.4	38.1	2.0	(41)
(42)	—molasses added, dried...	80.2	8.7	42.3	3.9	9.8	14.5	12.8	40.2	2.9	(42)
(43)	Rutabaga tops, dried.....	(87.7)	11.8	56.6	3.8	20.8	14.8	10.7	39.6	1.8	(43)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
(1)	68	74	56	71	70	8	15.8	64.3	14.8	21.4	19.3	37.5	7.0	(1)	
(2)	76	87	36	82	81	1	35.1	76.9	8.3	40.3	15.6	29.0	6.8	(2)	
(3)	69	82	24	63	90	3	32.1	71.4	8.3	39.1	10.9	34.2	7.5	(3)	
(4)	62	62	61	63	53	3	5.8	61.5	4.7	9.4	29.6	52.5	3.8	(4)	
(5)	56	39	55	60	42	7	2.5	54.0	6.4	6.3	32.6	52.5	2.2	(5)	
(6)	56	39	56	60	39	5	2.4	54.1	6.4	6.2	32.7	52.6	2.1	(6)	
(7)	51	50	67	28	62	2	4.7	47.8	11.7	9.3	43.9	31.6	3.5	(7)	
(8)	60	66	60	60	47	3	6.7	58.4	5.8	10.2	36.3	45.0	2.7	(8)	
(9)	70	70	72	69	52	2	7.1	67.5	5.7	10.2	36.3	45.3	2.5	(9)	
(10)	27	-41	26	40	33	3	-1.9	31.5	1.5	4.7	35.9	55.1	2.8	(10)	
(11)	23	-2	29	22	46	2	-0.1	24.4	1.3	5.5	32.9	58.2	2.1	(11)	
(12)	63	45	69	61	49	4	2.8	58.6	8.6	6.2	35.3	47.5	1.9	(12)	
(13)	61	44	68	58	45	3	2.6	54.9	11.3	5.9	34.6	46.4	1.8	(13)	
(14)	69	62	75	67	36	4	5.5	65.9	5.8	8.8	37.7	46.3	1.4	(14)	
(15)	57	50	63	55	34	27	3.5	51.9	11.3	7.0	36.3	42.9	2.5	(15)	
(16)	65	62	71	62	40	6	5.8	59.0	11.3	9.4	37.0	39.7	2.6	(16)	
(17)	60	58	65	58	33	6	4.6	54.2	11.4	8.0	34.5	43.7	2.4	(17)	
(18)	57	51	62	55	35	6	3.4	51.6	11.4	6.6	35.6	43.8	2.6	(18)	
(19)	50	38	56	47	30	9	1.9	45.1	11.2	5.0	37.3	44.3	2.2	(19)	
(20)	48	38	51	48	56	2	2.3	41.8	16.2	6.1	33.3	42.9	1.5	(20)	
(21)	37	46	7	53	75	4	3.4	36.6	16.5	7.4	27.8	43.4	4.9	(21)	
(22)	20	7	12	29	31	6	0.2	16.2	17.3	3.1	45.1	33.0	1.5	(22)	
(23)	49	31	58	40	32	10	1.6	39.7	18.1	5.3	33.3	36.6	1.7	(23)	
(24)	51	43	61	44	36	2	2.7	41.8	20.1	6.2	35.2	36.6	1.9	(24)	
(25)	53	37	62	47	47	2	2.2	44.0	19.0	6.0	36.5	36.7	1.8	(25)	
(26)	70	0	86	62	27	2	0	56.4	21.0	4.8	43.5	28.9	1.8	(26)	
(27)	64	20	78	59	31	6	1.2	55.2	15.7	5.9	40.0	36.8	1.6	(27)	
(28)	82	76	23	91	76	6	7.1	80.4	4.5	9.3	9.3	75.4	1.5	(28)	
(29)	68	68	30	76	86	20	9.4	75.6	11.2	13.8	14.2	47.4	13.4	(29)	
(30)	68	58	5	77	78	5	8.0	76.6	11.0	13.7	8.0	50.6	16.7	(30)	
(31)	83	78	37	87	88	10	12.0	93.0	6.6	15.4	4.5	59.6	13.9	(31)	
(32)	66	79	53	72	71	2	10.7	61.1	10.5	13.6	33.0	40.6	2.3	(32)	
(33)	65	57	61	71	52	2	6.5	60.1	9.3	11.4	36.9	40.2	2.2	(33)	
(34)	81	82	66	87	86	4	14.6	71.4	17.7	17.8	18.6	41.6	4.3	(34)	
(35)	38	33	-42	55	97	3	5.4	34.8	22.9	16.2	8.5	49.8	2.6	(35)	
(36)	95	91	121	95	97	3	29.9	117.1	5.1	33.9	3.5	36.3	22.2	(36)	
(37)	52	54	57	49	46	1	4.7	49.2	7.9	8.7	28.7	52.2	2.5	(37)	
(38)	64	59	65	64	63	2	4.9	61.3	6.9	8.3	31.1	51.4	2.3	(38)	
(39)	60	44	65	57	61	5	3.1	57.0	7.4	7.0	36.1	46.7	2.8	(39)	
(40)	49	66	35	51	71	2	8.8	45.0	12.2	13.4	31.5	39.9	3.0	(40)	
(41)	64	67	30	74	66	4	13.5	57.8	13.3	20.1	15.8	48.2	2.6	(41)	
(42)	56	60	14	66	82	2	10.9	52.8	12.2	18.1	16.0	50.1	3.6	(42)	
(43)	83	79	83	86	47	8	13.4	64.5	23.7	16.9	12.2	45.1	2.1	(43)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Rutabaga crowns and tops, dehydrated.....	87.3	7.6	46.4	5.1	34.4	9.3	8.6	32.6	1.9	(1)
(2)	—roots.....	12.1	0.8	10.8	12.0	0.8	1.1	1.2	8.7	0.3	(2)
(3)	—crowns and tops, fed green.....	12.2	2.0	9.4	3.7	1.8	2.3	1.6	5.8	0.7	(3)
(4)	—crowns and tops, fed green.....	9.6	1.5	6.4	3.3	2.4	1.7	1.4	3.8	0.3	(4)
(5)	—crown and top silage..	11.1	1.6	8.3	4.0	1.7	2.0	1.9	4.8	0.7	(5)
(6)	—crown and top silage..	22.8	1.8	10.7	5.1	11.2	2.1	1.8	7.2	0.5	(6)
(7)	—top silage.....	14.7	1.9	8.8	3.6	4.5	2.4	1.8	5.5	0.5	(7)
(8)	Rye straw.....	87.5	-1.2	40.1	.....	3.4	2.3	43.6	36.7	1.5	(8)
(9)	—straw, boiled or steamed	91.4	-0.4	76.2	.....	2.0	0.2	66.9	21.7	0.6	(9)
(10)	—straw, steamed, dried...	87.8	-1.4	48.0	.....	2.5	2.4	39.8	41.2	1.9	(10)
(11)	—straw, treated with $\text{Ca}(\text{OH})_2$ .....	30.4	-1.2	15.2	.....	2.9	0.6	17.3	9.4	0.2	(11)
(12)	—straw, treated with $\text{HCl}$ , dried.....	89.9	0.3	42.9	143.7	7.2	2.7	37.3	41.4	1.3	(12)
(13)	—straw, treated with $\text{NaOH}$ , dried.....	89.6	-1.9	56.1	.....	4.4	1.8	51.2	30.9	1.3	(13)
(14)	—straw, treated with $\text{Na}_2\text{S}$ , dried.....	91.0	-0.7	71.0	.....	3.9	2.0	54.1	29.8	1.2	(14)
(15)	—straw, winter.....	85.7	0.1	37.6	336.5	4.2	2.8	39.1	38.2	1.4	(15)
(16)	—straw, winter, treated with $\text{NaHCO}_3$ , dried	89.6	-2.4	53.4	.....	3.0	2.5	51.3	31.8	1.0	(16)
(17)	—straw, winter, treated with $\text{NaOH}$ , wet.....	21.9	-1.0	13.2	.....	1.3	0.4	13.9	6.1	0.2	(17)
(18)	—grain.....	84.8	8.3	72.4	7.7	1.4	10.5	1.5	70.1	1.3	(18)
(19)	—bran.....	90.7	10.4	55.6	4.3	5.0	15.5	7.8	58.5	3.9	(19)
(20)	—distillers' dried grains..	89.7	11.2	57.8	4.2	2.4	18.7	13.5	49.3	5.8	(20)
(21)	—feed.....	88.3	10.9	65.2	4.9	4.9	14.8	5.5	59.7	3.4	(21)
(22)	—feed flour, low-grade...	85.8	7.2	80.4	10.1	1.3	9.5	.....	73.5	1.5	(22)
(23)	—flour middlings.....	86.1	9.4	69.0	6.4	3.1	13.0	3.8	63.4	2.8	(23)
(24)	—germ meal.....	90.0	29.4	85.3	1.9	5.0	32.3	3.8	41.1	7.8	(24)
(25)	—middlings.....	88.4	9.8	71.2	6.3	3.4	13.1	3.7	65.3	2.9	(25)
(26)	Ryegrass hay, all expts...	81.3	4.1	48.2	10.7	7.4	8.0	24.3	39.9	1.7	(26)
(27)	Ryegrass hay, Italian.....	82.8	2.4	49.3	19.2	6.9	5.8	25.3	43.4	1.4	(27)
(28)	—hay, Italian, prebloom.	82.2	4.8	55.6	10.7	9.0	8.5	19.6	43.1	2.0	(28)
(29)	—hay, Italian, early bloom	83.4	1.8	45.4	25.0	7.0	4.6	30.3	40.7	0.8	(29)
(30)	—hay, Italian, early bloom very poor quality....	82.5	1.1	40.2	36.5	5.2	4.3	34.0	38.3	0.7	(30)
(31)	—hay, Italian, early bloom medium quality.....	82.5	1.6	45.0	27.6	5.9	4.4	30.4	41.1	0.7	(31)
(32)	—hay, Italian, early bloom, good quality.	83.8	1.7	47.5	26.9	6.9	4.4	28.9	43.0	0.6	(32)
(33)	—hay, Italian, full bloom	80.3	1.1	44.5	40.0	5.1	4.2	22.6	47.4	1.0	(33)
(34)	Ryegrass hay, perennial...	83.4	3.8	49.6	12.1	7.5	7.4	25.4	41.3	1.8	(34)
(35)	—hay, perennial, early bloom.....	84.5	2.2	44.9	19.1	8.8	5.1	29.2	40.3	1.1	(35)
(36)	—hay, perennial, pre-bloom.....	83.1	5.9	56.7	8.6	8.5	9.6	23.8	39.0	2.2	(36)
(37)	—hay, perennial, full bloom.....	80.9	2.0	45.5	21.2	6.0	5.0	24.5	44.3	1.1	(37)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%						%	
( 1 )	85	78	96	85	65	2	8.7	53.2	39.4	11.2	9.8	37.4	2.2	( 1 )	
( 2 )	93	75	89	96	79	6	6.8	89.0	6.8	9.1	10.0	71.5	2.6	( 2 )	
( 3 )	85	85	72	90	69	1	16.3	77.3	14.6	19.2	13.4	46.9	5.9	( 3 )	
( 4 )	85	86	98	81	66	2	15.5	66.3	25.1	18.0	14.7	38.9	3.3	( 4 )	
( 5 )	82	81	81	85	69	1	14.8	74.6	15.6	18.3	16.8	43.2	6.1	( 5 )	
( 6 )	88	83	107	87	71	2	7.7	47.1	49.3	9.3	8.0	31.0	2.4	( 6 )	
( 7 )	82	79	85	85	68	2	13.0	60.2	30.8	16.4	12.3	37.0	3.5	( 7 )	
( 8 )	48	-53	55	43	44	12	-1.4	45.8	3.9	2.6	49.8	42.0	1.7	( 8 )	
( 9 )	84	-193	86	78	130	2	-0.4	83.0	2.2	0.2	73.2	23.7	0.7	( 9 )	
(10)	54	-58	66	49	68	4	-1.6	54.7	2.8	2.7	45.3	47.0	2.2	(10)	
(11)	56	-185	80	25	32	2	-3.9	49.9	9.6	2.1	57.0	30.5	0.8	(11)	
(12)	51	11	52	52	59	7	0.3	47.7	8.0	3.0	41.5	46.1	1.4	(12)	
(13)	83	-103	78	54	44	41	-2.1	62.6	4.9	2.0	57.1	34.5	1.5	(13)	
(14)	80	-38	94	63	80	2	-0.8	78.0	4.3	2.2	59.5	32.7	1.3	(14)	
(15)	46	4	54	39	48	13	0.1	43.9	4.9	3.3	45.6	44.6	1.6	(15)	
(16)	61	-95	80	41	78	2	-2.7	59.6	3.4	2.8	57.3	35.4	1.1	(16)	
(17)	66	-224	85	39	12	4	-4.5	60.4	6.0	2.0	63.3	27.9	0.8	(17)	
(18)	86	79	-27	90	53	5	9.8	85.4	1.7	12.4	1.8	82.6	1.5	(18)	
(19)	62	67	23	64	68	7	11.5	61.3	5.5	17.1	8.6	64.5	4.3	(19)	
(20)	60	60	56	60	72	6	12.5	64.4	2.7	20.8	15.1	54.9	6.5	(20)	
(21)	74	74	35	80	59	9	12.4	73.8	5.6	16.8	6.2	67.5	3.9	(21)	
(22)	91	76	-472	96	75	6	8.4	93.7	1.5	11.1	....	85.6	1.8	(22)	
(23)	78	72	11	85	86	2	10.9	80.2	3.6	15.1	4.4	73.7	3.2	(23)	
(24)	91	91	66	93	86	6	32.7	94.8	5.5	35.9	4.2	45.7	8.7	(24)	
(25)	82	75	27	85	75	10	11.1	80.5	3.9	14.8	4.2	73.8	3.3	(25)	
(26)	65	51	66	66	46	33	5.0	59.3	9.1	9.9	29.9	49.0	2.1	(26)	
(27)	64	42	65	67	42	15	2.9	59.5	8.3	7.0	30.5	52.5	1.7	(27)	
(28)	74	56	74	79	53	3	5.8	67.7	11.0	10.3	23.8	52.5	2.4	(28)	
(29)	59	38	64	58	35	8	2.1	54.4	8.4	5.5	36.3	48.9	0.9	(29)	
(30)	52	25	60	48	23	2	1.3	48.7	6.3	5.2	41.2	46.5	0.8	(30)	
(31)	58	36	64	57	34	2	1.9	54.6	7.1	5.3	36.8	50.0	0.8	(31)	
(32)	61	39	64	62	45	2	2.0	56.7	8.2	5.2	34.5	51.4	0.7	(32)	
(33)	59	26	46	63	36	2	1.4	55.4	6.4	5.2	28.2	59.0	1.2	(33)	
(34)	64	51	66	66	46	14	4.5	59.5	9.0	8.9	30.4	49.6	2.1	(34)	
(35)	58	44	65	56	42	4	2.6	53.1	10.4	6.0	34.6	47.7	1.3	(35)	
(36)	74	62	75	78	49	4	7.1	68.2	10.2	11.5	28.7	47.0	2.6	(36)	
(37)	60	41	55	65	49	3	2.5	56.3	7.4	6.2	30.3	54.7	1.4	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Ryegrass straw.....	87.0	0.9	49.7	55.1	6.2	4.0	29.7	46.0	1.1	(1)
(2)	Ryegrass, Italian, early bloom, fed green....	35.3	0.9	20.0	21.8	2.9	2.0	10.6	19.5	0.3	(2)
(3)	Ryegrass sainfoin mixed hay	86.2	5.7	47.7	7.4	7.2	10.2	28.0	38.5	2.3	(3)
(4)	Saccharista hay.....	92.1	0	5.2	.....	3.0	5.6	43.9	37.4	2.2	(4)
(5)	Safflower fodder, prebloom, fed green.....	16.8	1.3	9.8	6.4	1.6	2.1	6.3	6.4	0.4	(5)
(6)	—silage.....	16.6	1.6	11.4	6.1	1.5	2.1	5.2	7.1	0.7	(6)
(7)	—oil meal.....	92.2	28.3	57.0	1.0	6.9	32.9	21.6	21.7	9.1	(7)
(8)	Sainfoin hay, common, early bloom.....	88.4	14.0	53.5	2.8	5.7	20.0	24.9	34.5	3.4	(8)
(9)	—hay, half bloom, brown	(87.0)	11.5	51.9	3.5	6.1	18.0	28.2	30.4	4.3	(9)
(10)	—fodder, early bloom, fed green.....	16.8	2.7	10.8	3.0	1.1	3.8	4.7	6.6	0.6	(10)
(11)	—silage, half bloom.....	24.0	2.4	11.2	3.6	1.8	4.9	8.4	7.5	1.4	(11)
(12)	Saltbush, Australian, dry...	96.4	17.2	46.5	1.7	18.6	20.6	16.4	39.5	1.3	(12)
(13)	Saltbush, silvery, dry.....	94.7	6.4	28.3	3.4	19.3	9.8	27.4	36.8	1.4	(13)
(14)	Saltgrass hay, seashore.....	79.0	3.2	30.3	8.3	6.2	6.2	20.9	43.5	2.2	(14)
(15)	Sandbur grass, fed green....	(20.0)	1.5	13.6	8.1	1.4	2.1	7.3	8.7	0.5	(15)
(16)	—grass, early bloom, fed green.....	(20.0)	1.5	13.7	8.4	1.3	2.1	7.6	8.6	0.4	(16)
(17)	—grass, late bloom, fed green.....	(20.0)	1.6	13.5	7.3	1.5	2.3	6.8	8.8	0.6	(17)
(18)	Satintail grass, Brazil, very immature, dried.....	83.8	4.7	39.1	7.3	7.0	9.0	35.5	30.0	2.3	(18)
(19)	Sedge hay.....	85.7	4.8	43.8	8.1	4.9	9.6	26.4	42.5	2.3	(19)
(20)	Serradella hay.....	81.3	10.6	43.3	3.1	7.0	15.0	27.2	29.2	2.9	(20)
(21)	—hay, brown.....	81.7	7.7	43.8	4.7	7.0	13.0	25.8	33.5	2.4	(21)
(22)	—hay, full bloom.....	85.6	14.3	50.2	2.5	9.9	19.3	25.3	26.6	4.5	(22)
(23)	—hay, late bloom.....	80.7	9.8	38.3	2.9	6.0	15.7	29.3	26.5	3.2	(23)
(24)	Sesame oil meal.....	90.2	36.7	70.8	0.9	10.6	40.3	5.9	22.1	11.3	(24)
(25)	Sheepbush, Australian, early bloom, dry.....	(87.0)	9.0	45.7	4.1	11.3	12.1	22.2	39.1	2.3	(25)
(26)	—mature, dry.....	(87.0)	10.0	45.9	3.6	12.2	13.6	22.0	34.7	4.5	(26)
(27)	Sheepbush, ballhead, dry...	(87.0)	2.9	53.7	17.9	8.4	5.9	21.3	46.4	5.0	(27)
(28)	Silvergrass, Chinese, field horsetail mixed hay...	85.1	1.4	40.6	27.7	6.0	5.9	34.2	35.8	3.2	(28)
(29)	Silvergrass, Chinese, bush lespedeza mixed hay...	84.1	3.0	42.7	13.1	6.1	7.4	34.0	33.7	2.9	(29)
(30)	Skin and dried "stick" meal...	86.8	58.9	75.3	0.3	9.8	62.7	.....	6.8	.....	(30)
(31)	Sloughgrass hay, Old World	83.0	6.5	48.1	6.4	7.0	10.6	27.3	35.4	2.7	(31)
(32)	—hay, Old World.....	90.7	6.3	54.3	7.5	7.7	11.6	29.8	33.7	2.9	(32)
(33)	Soapweed hay, small.....	92.8	1.7	52.8	31.5	7.4	6.8	38.6	37.9	2.1	(33)
(34)	—stems, dry.....	91.4	0.6	42.3	68.0	5.6	4.4	35.4	45.0	1.0	(34)
(35)	Sorghum bagasse (Goats)...	88.8	0.5	54.3	110.3	2.8	3.5	30.5	50.6	1.4	(35)
(36)	—fodder, grain varieties, dry, all expts.....	90.0	2.3	49.3	19.9	9.4	6.2	27.3	45.4	1.7	(36)
(37)	—fodder, feterita, dry....	86.3	2.6	49.7	18.2	8.4	5.2	29.2	41.9	1.6	(37)
(38)	—fodder, kafir, dry.....	90.0	4.0	50.0	11.8	9.8	7.8	25.8	44.7	1.9	(38)
(39)	—fodder, kafir, late bloom, dry.....	91.4	6.3	54.6	7.7	11.2	10.0	23.8	44.3	2.1	(39)
(40)	—fodder, milo, dry.....	89.4	1.9	61.9	32.1	7.6	4.9	22.0	53.2	1.7	(40)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
							%	%						%	
( 1 )	61	22	60	65	44	3	1.0	57.1	7.1	4.6	34.1	53.1	1.1	( 1 )	
( 2 )	62	43	64	62	46	2	2.5	56.8	8.1	5.8	30.1	55.2	0.8	( 2 )	
( 3 )	59	56	54	64	41	2	6.6	55.3	8.3	11.8	32.5	44.7	2.7	( 3 )	
( 4 )	2	0	4	9	0	1	.....	5.6	3.3	6.1	47.7	40.5	2.4	( 4 )	
( 5 )	63	64	59	66	60	2	7.9	58.6	9.5	12.4	37.4	38.2	2.5	( 5 )	
( 6 )	72	76	61	74	32	4	9.6	68.5	8.9	12.6	31.4	42.7	4.4	( 6 )	
( 7 )	53	36	-7	48	96	8	30.7	61.8	7.5	35.7	23.4	23.5	9.9	( 7 )	
( 8 )	62	70	36	74	66	2	15.8	60.5	6.4	22.6	28.2	39.0	3.8	( 8 )	
( 9 )	59	64	45	67	76	2	13.2	59.6	7.0	20.7	32.4	35.0	4.9	( 9 )	
(10)	66	72	42	78	67	2	16.3	64.3	6.4	22.6	28.2	39.0	3.8	(10)	
(11)	45	50	29	53	74	2	10.2	46.8	7.5	20.4	35.2	30.9	6.0	(11)	
(12)	59	83	27	61	16	3	17.8	48.2	19.3	21.4	17.0	40.9	1.4	(12)	
(13)	38	66	8	49	52	3	6.8	29.9	20.4	10.3	28.9	38.9	1.5	(13)	
(14)	40	52	25	46	37	1	4.1	38.4	7.8	7.9	26.5	55.0	2.8	(14)	
(15)	71	70	74	69	69	6	7.5	68.1	7.0	10.7	36.5	43.5	2.8	(15)	
(16)	72	71	75	69	64	4	7.3	68.4	6.7	10.3	37.8	43.2	2.0	(16)	
(17)	70	70	72	68	78	2	8.1	67.4	7.7	11.6	33.9	44.0	2.8	(17)	
(18)	49	52	56	42	38	2	5.6	46.7	8.3	10.8	42.4	35.7	2.8	(18)	
(19)	53	50	58	53	23	1	5.6	51.1	5.7	11.2	30.8	49.6	2.7	(19)	
(20)	55	70	43	58	64	4	13.0	53.3	8.6	18.5	33.4	35.9	3.6	(20)	
(21)	56	59	45	62	76	2	9.4	53.6	8.6	15.9	31.6	41.0	2.9	(21)	
(22)	62	74	50	63	65	1	16.7	58.7	11.6	22.6	29.6	31.0	5.2	(22)	
(23)	47	63	37	48	66	1	12.2	47.4	7.4	19.4	36.3	32.9	4.0	(23)	
(24)	79	91	55	65	65	16	40.7	78.5	11.7	44.7	6.5	24.6	12.5	(24)	
(25)	58	74	25	71	66	4	10.3	52.5	13.0	13.9	25.5	45.0	2.6	(25)	
(26)	54	74	17	70	77	4	11.5	52.8	14.0	15.6	25.3	39.9	5.2	(26)	
(27)	66	48	48	78	39	7	3.3	61.7	9.6	6.8	24.5	53.4	5.7	(27)	
(28)	49	24	63	41	41	2	1.7	47.7	7.1	6.9	40.2	42.0	3.8	(28)	
(29)	53	41	65	44	43	2	3.6	50.8	7.3	8.8	40.4	40.1	3.4	(29)	
(30)	87	94	..	..	108	6	67.9	86.8	11.3	72.2	.....	.....	7.8	(30)	
(31)	62	61	69	58	39	1	7.8	58.0	8.5	12.8	32.9	42.6	3.2	(31)	
(32)	59	55	75	54	72	1	7.0	59.9	8.5	12.8	32.9	42.6	3.2	(32)	
(33)	63	24	71	64	-9	3	1.8	56.9	8.0	7.3	41.6	40.8	2.3	(33)	
(34)	50	14	33	70	-63	2	0.7	46.3	6.1	4.8	38.7	49.3	1.1	(34)	
(35)	62	14	64	65	46	1	0.6	61.2	3.2	3.9	34.4	56.9	1.6	(35)	
(36)	61	38	63	61	53	14	2.6	54.8	10.4	6.9	30.3	50.5	1.9	(36)	
(37)	62	50	66	61	61	2	3.0	57.6	9.7	6.0	33.8	48.6	1.9	(37)	
(38)	61	50	61	63	52	7	4.4	55.6	10.9	8.7	28.7	49.6	2.1	(38)	
(39)	66	63	64	69	53	3	6.9	59.7	12.3	10.9	26.0	48.5	2.3	(39)	
(40)	74	38	72	78	71	2	2.1	69.2	8.5	5.5	24.6	59.5	1.9	(40)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS										Row No
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
		%	%	%	1:	%	%	%	%	%		
( 1 )	Sorghum fodder, shallu, dry	93.0	-0.3	46.5	.....	7.9	2.8	35.4	45.6	1.3	( 1 )	
( 2 )	—fodder, sorgho or sweet, dry.....	84.4	2.2	49.5	21.1	5.9	5.7	26.7	44.4	1.7	( 2 )	
( 3 )	—fodder, sorgho or sweet, dough stage, dry....	89.4	2.0	52.5	25.5	7.1	5.8	27.8	46.8	1.9	( 3 )	
( 4 )	—fodder, very immature, dried.....	87.9	7.1	44.9	5.3	8.7	12.7	29.1	36.1	1.3	( 4 )	
( 5 )	—Sudangrass hay.....	90.4	4.7	47.9	9.1	7.4	9.3	30.5	41.6	1.6	( 5 )	
( 6 )	—Sudangrass hay, pre-bloom.....	88.1	8.7	47.8	4.5	8.5	13.7	29.3	35.3	1.3	( 6 )	
( 7 )	—Sudangrass hay, pre-bloom.....	78.1	6.4	44.4	6.0	6.7	10.6	26.0	33.6	1.2	( 7 )	
( 8 )	—Sudangrass hay, half bloom.....	91.3	7.2	48.5	5.7	9.3	11.3	27.9	40.6	2.2	( 8 )	
( 9 )	—Sudangrass hay, full bloom.....	89.3	6.1	44.4	6.3	7.7	10.6	31.3	38.3	1.4	( 9 )	
(10)	—head stems, kafir, dry...	92.0	1.4	42.0	30.2	7.9	6.7	19.6	56.8	1.0	(10)	
(11)	—leaves, dough stage, dried (Goats).....	87.6	5.7	54.8	8.6	4.1	9.5	24.3	45.1	4.6	(11)	
(12)	—stover, milo, dry.....	93.6	-0.6	45.6	.....	10.2	3.5	33.5	44.8	1.6	(12)	
(13)	—straw, Sudangrass.....	90.4	3.6	43.7	11.2	7.6	7.8	30.6	42.9	1.5	(13)	
(14)	—fodder, sorgho or sweet, fed green.....	19.3	0.5	12.4	23.0	1.0	1.2	5.1	11.5	0.5	(14)	
(15)	—fodder, sorgho or sweet, early bloom, fed green	16.4	0.5	11.1	21.7	1.0	1.0	4.8	9.2	0.4	(15)	
(16)	—fodder, Sudangrass, fed green.....	21.6	2.0	15.1	6.5	1.5	2.8	6.3	10.2	0.8	(16)	
(17)	—fodder, Sudangrass, very immature, fed green.	19.0	1.6	12.4	6.8	1.4	2.3	8.1	6.7	0.5	(17)	
(18)	—fodder, Sudangrass, pre-bloom, fed green.....	19.6	2.2	14.7	5.7	1.4	2.8	5.9	8.6	0.9	(18)	
(19)	—silage, broomcorn.....	20.0	0.5	9.6	19.6	1.9	1.3	6.8	9.8	0.2	(19)	
(20)	—silage, darso.....	26.9	0.1	14.8	260.7	1.5	1.9	6.4	16.7	0.4	(20)	
(21)	—silage, sorgho or sweet	31.6	0.4	18.5	40.5	2.1	2.0	6.9	19.7	0.9	(21)	
(22)	—silage, Sudangrass.....	14.9	1.5	8.5	4.5	1.8	2.2	6.1	4.3	0.5	(22)	
(23)	—grain, all expts.....	88.4	7.5	75.4	9.0	2.0	11.2	2.7	69.5	3.0	(23)	
(24)	—grain, broomcorn, low fiber.....	85.4	5.0	62.3	11.7	2.4	10.2	3.2	65.3	4.3	(24)	
(25)	—grain, broomcorn, high fiber.....	91.0	5.1	53.6	9.6	5.6	11.7	11.5	59.5	2.7	(25)	
(26)	—grain, darso.....	88.5	7.3	74.3	9.2	1.7	11.3	3.0	69.1	3.4	(26)	
(27)	—grain, durra.....	87.9	5.6	71.2	11.6	4.0	10.1	2.6	67.5	3.7	(27)	
(28)	—grain, feterita.....	89.8	9.8	78.1	7.0	1.6	12.8	1.6	70.8	3.0	(28)	
(29)	—grain, kafir.....	88.0	9.0	79.4	7.8	1.6	11.1	2.5	70.3	2.5	(29)	
(30)	—grain, milo.....	89.2	8.7	84.2	8.6	1.7	11.2	2.2	71.3	2.8	(30)	
(31)	—grain, sorgho or sweet..	89.9	6.0	77.9	11.9	1.5	9.9	3.2	72.4	2.9	(31)	
(32)	—head chops, kafir.....	90.4	6.1	68.7	10.4	3.1	9.6	8.0	67.3	2.4	(32)	
(33)	—head chops, milo.....	90.6	7.1	77.9	10.1	3.3	9.2	7.1	68.6	2.4	(33)	
(34)	Soybean hay.....	87.4	10.2	46.8	3.6	7.6	14.9	28.7	32.9	3.3	(34)	
(35)	—hay.....	88.3	10.5	50.9	3.8	5.8	14.0	30.8	35.7	2.0	(35)	
(36)	—hay, full bloom.....	86.5	11.8	51.1	3.3	5.8	15.9	32.5	29.2	3.1	(36)	
(37)	—hay, late bloom (Goats)	82.6	10.9	54.4	4.0	2.1	15.5	25.5	37.3	2.2	(37)	

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
( 1 )	54	-9	65	50	32	1	-0.3	50.0	8.5	3.0	38.1	49.0	1.4	( 1 )	
( 2 )	61	39	63	63	65	17	2.6	58.6	7.0	6.8	31.6	52.6	2.0	( 2 )	
( 3 )	62	34	65	64	57	5	2.2	58.7	7.9	6.5	31.1	52.4	2.1	( 3 )	
( 4 )	56	56	66	50	18	3	8.1	51.1	9.9	14.5	33.1	41.0	1.5	( 4 )	
( 5 )	57	51	62	54	51	14	5.2	53.0	8.2	10.3	33.7	46.0	1.8	( 5 )	
( 6 )	60	64	68	52	28	1	9.9	54.3	9.7	15.5	33.3	40.0	1.5	( 6 )	
( 7 )	62	60	73	54	35	2	8.2	56.9	8.6	13.6	33.3	42.9	1.6	( 7 )	
( 8 )	57	64	60	53	61	2	7.9	53.1	10.2	12.4	30.6	44.4	2.4	( 8 )	
( 9 )	53	57	62	46	42	4	6.8	49.7	8.6	11.9	35.0	42.9	1.6	( 9 )	
(10)	49	20	33	58	53	2	1.5	45.6	8.6	7.3	21.3	61.7	1.1	(10)	
(11)	62	60	65	63	47	1	6.5	62.5	4.7	10.9	27.7	51.4	5.3	(11)	
(12)	53	-18	66	49	58	2	-0.6	48.7	10.9	3.6	35.8	48.0	1.7	(12)	
(13)	52	46	60	48	34	2	4.0	48.3	8.4	8.6	33.8	47.5	1.7	(13)	
(14)	67	44	56	72	65	4	2.7	64.3	5.3	6.1	26.3	59.6	2.7	(14)	
(15)	71	48	68	74	63	2	3.0	67.7	6.1	6.2	29.3	56.0	2.4	(15)	
(16)	72	72	76	68	72	4	9.4	69.9	6.8	13.0	29.1	47.2	2.9	(16)	
(17)	68	69	70	66	63	4	8.3	65.0	7.4	12.0	42.6	35.6	2.4	(17)	
(18)	76	79	82	69	83	2	11.2	74.9	7.2	14.2	30.3	43.6	4.7	(18)	
(19)	52	36	50	55	69	1	2.3	48.1	9.3	6.5	34.2	48.8	1.2	(19)	
(20)	58	3	39	70	60	3	0.2	55.0	5.7	7.0	23.9	61.8	1.6	(20)	
(21)	62	23	56	67	63	2	1.4	59.4	6.7	6.2	21.7	62.7	2.7	(21)	
(22)	62	69	67	49	71	3	10.4	57.3	12.3	15.1	41.1	28.0	3.5	(22)	
(23)	84	67	33	89	76	31	8.5	85.3	2.3	12.7	3.0	78.6	3.4	(23)	
(24)	71	48	28	75	78	18	5.8	73.0	2.8	12.0	3.7	76.5	5.0	(24)	
(25)	59	43	35	66	86	4	5.6	58.9	6.2	12.9	12.6	65.3	3.0	(25)	
(26)	82	64	10	88	78	4	8.2	83.9	1.9	12.8	3.4	78.1	3.8	(26)	
(27)	81	56	60	85	79	7	6.4	81.0	4.5	11.5	3.0	76.8	4.2	(27)	
(28)	84	76	-66	91	74	6	10.9	87.0	1.8	14.3	1.8	78.7	3.4	(28)	
(29)	89	81	55	92	76	2	10.2	90.2	1.8	12.6	2.8	80.0	2.8	(29)	
(30)	92	78	66	96	88	8	9.8	94.4	1.9	12.6	2.5	79.8	3.2	(30)	
(31)	85	61	100	89	66	2	6.7	86.7	1.7	11.0	3.6	80.5	3.2	(31)	
(32)	76	63	61	80	74	2	6.7	76.0	3.4	10.6	8.8	74.6	2.6	(32)	
(33)	86	76	52	91	87	4	7.8	86.0	3.6	10.2	7.8	75.7	2.7	(33)	
(34)	57	69	39	65	54	16	11.7	53.6	8.7	17.0	32.8	37.7	3.8	(34)	
(35)	60	75	53	60	59	2	11.9	57.7	6.6	15.9	34.9	40.3	2.3	(35)	
(36)	62	74	48	70	47	2	13.6	59.1	6.7	18.4	37.6	33.7	3.6	(36)	
(37)	66	70	62	72	19	1	13.2	65.9	2.6	18.8	30.9	45.0	2.7	(37)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Soybean hay, milk stage...	83.2	9.0	45.9	4.1	5.8	14.1	35.2	25.9	2.2	(1)
(2)	—hay, 25% fiber.....	88.2	11.5	49.2	3.3	5.9	16.7	25.2	36.3	4.1	(2)
(3)	—hay, over 29% fiber.....	84.8	11.0	48.6	3.4	5.8	16.0	31.7	28.5	2.8	(3)
(4)	—pods, dry.....	83.2	2.2	48.2	21.3	7.8	4.9	28.0	41.3	1.2	(4)
(5)	—straw.....	85.7	1.4	36.9	25.1	6.0	4.9	36.4	37.0	1.4	(5)
(6)	—straw meal.....	89.8	2.1	43.7	19.8	5.4	5.1	39.3	39.3	0.7	(6)
(7)	—fodder, fed green.....	21.2	2.5	13.2	4.2	2.3	3.3	6.3	8.4	0.9	(7)
(8)	—fodder, fed green.....	22.2	3.8	14.1	2.7	2.4	4.7	5.4	8.9	0.8	(8)
(9)	—fodder, half bloom, fed green.....	21.7	2.5	12.6	4.1	2.3	3.2	7.0	8.4	0.8	(9)
(10)	—fodder, full bloom, fed green.....	16.2	2.2	10.2	3.6	1.8	2.9	4.4	6.5	0.6	(10)
(11)	—fodder, late bloom, fed green.....	22.3	2.8	13.9	4.0	2.4	3.6	6.0	9.4	0.9	(11)
(12)	—fodder, milk stage, fed green.....	23.9	2.6	14.7	4.6	2.1	3.5	6.4	11.1	0.8	(12)
(13)	—fodder, dough stage, fed green.....	24.2	3.1	16.0	4.2	2.7	3.9	7.3	8.9	1.4	(13)
(14)	—fodder, dough stage, fed green.....	20.6	3.6	13.3	2.7	1.9	4.5	5.7	7.8	0.7	(14)
(15)	—silage (Goats).....	25.8	3.2	15.8	3.9	2.8	4.1	9.7	7.0	2.2	(15)
(16)	—seed.....	91.0	33.1	82.3	1.5	5.0	36.8	6.4	25.4	17.4	(16)
(17)	—seed, steamed.....	74.7	25.5	91.7	2.6	4.2	28.0	6.2	23.9	12.4	(17)
(18)	—seed, under 5% fiber...	88.0	31.8	93.0	1.9	4.3	35.3	4.2	26.5	17.2	(18)
(19)	—seed, 5-7% fiber.....	92.3	34.0	74.9	1.2	5.2	37.8	6.9	24.8	17.6	(19)
(20)	—seed, high fiber.....	91.4	31.1	94.5	2.0	5.1	34.2	10.3	26.5	15.3	(20)
(21)	—seed, under 13% moisture	91.4	33.2	80.7	1.4	5.0	36.8	6.6	25.5	17.5	(21)
(22)	—seed, 13-14% moisture..	86.6	33.0	96.5	1.9	4.5	36.3	3.8	25.6	16.4	(22)
(23)	—seed, sample grade, over 18% moisture.....	74.7	25.5	91.7	2.6	4.2	28.0	6.2	23.9	12.4	(23)
(24)	—seed, under 34% protein	89.2	28.1	94.6	2.4	5.4	31.6	6.8	27.8	17.6	(24)
(25)	—seed, 34% protein.....	88.7	31.6	93.8	2.0	4.3	35.0	5.4	26.7	16.8	(25)
(26)	—seed, 40% protein.....	91.5	36.2	66.1	0.8	4.8	40.3	7.0	22.7	16.7	(26)
(27)	—oil meal, hydraulic or expeller process.....	89.6	35.3	73.5	1.1	6.4	39.2	8.5	30.3	5.2	(27)
(28)	—oil meal, hydraulic or expeller process.....	89.9	33.1	78.5	1.4	6.4	39.8	7.2	31.0	5.5	(28)
(29)	—oil meal, 38% protein..	89.4	33.0	83.7	1.5	6.5	38.8	7.0	31.6	5.5	(29)
(30)	—oil meal, 40% protein..	91.2	31.9	70.5	1.2	6.6	40.4	8.1	31.1	5.0	(30)
(31)	—oil meal, 41% protein..	88.3	39.5	85.7	1.2	5.0	42.5	4.2	30.1	6.5	(31)
(32)	—oil meal, 45% protein..	88.0	36.9	72.9	1.0	5.1	46.6	4.8	21.6	9.9	(32)
(33)	—oil meal, solvent process	87.2	43.1	78.0	0.8	5.4	45.9	4.4	30.5	1.0	(33)
(34)	—oil meal, solvent process (Goats).....	88.4	42.4	75.8	0.8	5.1	46.6	5.8	30.1	0.8	(34)
(35)	Spelt straw.....	81.6	1.1	31.7	29.8	6.1	2.4	38.8	33.5	0.8	(35)
(36)	—straw pulp.....	93.9	0	60.0	.....	5.3	1.6	71.5	14.9	0.6	(36)
(37)	Sphagnum moss, molasses added, dry.....	82.3	4.0	42.0	9.8	7.5	9.3	7.4	57.6	0.5	(37)
(38)	Starch.....	88.7	.....	80.6	.....	0.1	.....	.....	88.6	.....	(38)
(39)	Sugar, wood.....	92.6	-3.3	64.3	.....	4.1	0.8	.....	87.7	.....	(39)
(40)	Sulfite waste liquors, dried	93.7	-5.7	-1.6	.....	10.1	2.4	14.4	66.1	0.7	(40)
(41)	Sunflower fodder, fed green.	12.3	0.7	7.8	9.8	1.5	1.1	3.4	6.1	0.2	(41)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract			
( 1 )	59	64	58	61	14	2	10.8	55.2	7.0	16.9	42.3	31.2	2.6	( 1 )		
( 2 )	56	69	35	64	62	12	13.0	55.8	6.7	18.9	28.6	41.2	4.6	( 2 )		
( 3 )	60	69	53	66	30	4	13.0	57.3	6.8	18.9	37.4	33.6	3.3	( 3 )		
( 4 )	63	44	51	73	57	2	2.6	57.9	9.4	5.9	33.7	49.5	1.5	( 4 )		
( 5 )	47	29	36	58	31	18	1.6	43.1	7.0	5.7	42.5	43.2	1.6	( 5 )		
( 6 )	51	41	40	66	3	1	2.3	48.7	6.0	5.7	43.8	43.7	0.8	( 6 )		
( 7 )	68	76	53	73	61	32	11.9	62.3	10.8	15.7	29.9	39.4	4.2	( 7 )		
( 8 )	68	82	43	76	66	6	17.2	63.7	10.6	21.0	24.5	40.3	3.6	( 8 )		
( 9 )	63	77	47	71	50	2	11.3	58.1	10.6	14.7	32.3	38.7	3.7	( 9 )		
(10)	68	75	58	73	56	10	13.6	63.0	11.4	18.2	27.2	39.3	3.9	(10)		
(11)	67	77	50	74	56	4	12.5	62.2	10.8	16.2	27.0	41.8	4.2	(11)		
(12)	65	74	43	77	42	6	11.0	61.3	8.9	14.8	26.6	46.3	3.4	(12)		
(13)	70	79	56	70	81	10	12.8	66.0	11.2	16.2	30.3	36.4	5.9	(13)		
(14)	67	80	48	75	68	3	17.4	64.5	9.2	21.7	27.8	37.7	3.6	(14)		
(15)	64	79	55	52	72	2	12.5	61.2	11.0	15.8	37.6	26.9	8.7	(15)		
(16)	73	90	-11	59	89	28	36.4	90.4	5.5	40.4	7.0	28.0	19.1	(16)		
(17)	109	91	178	120	95	2	34.1	122.8	5.6	37.5	8.3	32.0	16.6	(17)		
(18)	88	90	116	78	92	8	36.1	105.7	5.4	40.1	4.8	30.1	19.6	(18)		
(19)	64	90	-79	48	87	18	36.8	81.2	5.6	40.9	7.5	26.9	19.1	(19)		
(20)	90	91	96	84	91	2	34.0	103.4	5.6	37.4	11.3	29.0	16.7	(20)		
(21)	64	90	-23	57	88	26	36.3	88.3	5.5	40.3	7.2	27.9	19.1	(21)		
(22)	94	91	140	91	94	2	38.1	111.4	5.2	41.9	4.4	29.4	19.1	(22)		
(23)	109	91	178	120	95	2	34.1	122.8	5.6	37.5	8.3	32.0	16.6	(23)		
(24)	76	89	59	91	94	3	31.5	106.0	6.1	35.4	7.6	31.2	19.7	(24)		
(25)	88	90	118	79	92	10	35.6	105.8	5.4	39.5	6.1	30.0	19.0	(25)		
(26)	56	90	-128	31	84	12	39.6	72.2	5.2	44.0	7.6	24.9	18.3	(26)		
(27)	82	90	55	82	74	1	39.4	82.0	7.1	43.8	9.5	33.8	5.8	(27)		
(28)	87	83	74	95	86	33	36.8	87.3	7.1	44.3	8.0	34.5	6.1	(28)		
(29)	94	85	116	102	84	18	36.9	93.6	7.3	43.4	7.8	35.4	6.1	(29)		
(30)	77	79	18	87	89	12	35.0	77.3	7.2	44.3	8.9	34.1	5.5	(30)		
(31)	94	93	36	103	93	2	44.7	97.0	5.7	43.1	4.8	34.0	7.4	(31)		
(32)	72	79	70	68	81	1	41.9	82.8	5.8	53.0	5.4	24.6	11.2	(32)		
(33)	94	94	101	96	52	15	49.4	89.5	6.2	52.6	5.0	35.1	1.1	(33)		
(34)	91	91	101	89	47	3	48.0	85.8	5.8	52.7	6.6	34.0	0.9	(34)		
(35)	40	42	46	35	60	4	1.3	38.8	7.5	3.0	47.5	41.0	1.0	(35)		
(36)	65	0	79	24	0	3	0	64.0	5.6	1.7	76.1	16.0	0.6	(36)		
(37)	56	42	-46	72	-7	5	4.8	51.1	9.1	11.3	9.0	70.0	0.6	(37)		
(38)	85	..	..	91	..	1	..	90.9	0.1	..	..	99.9	..	(38)		
(39)	69	-394	..	77	37	7	-3.6	69.4	4.4	0.9	..	94.7	..	(39)		
(40)	0	-233	-110	30	152	5	-6.1	-1.7	10.8	2.6	15.4	70.4	0.8	(40)		
(41)	72	64	53	82	65	18	5.9	63.7	11.8	9.2	28.0	49.2	1.8	(41)		

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	( )
(1)	Sunflower fodder, fed green..	12.9	0.4	7.3	16.2	1.4	0.9	4.5	5.9	0.2	(1)
(2)	—fodder, prebloom, fed green.....	11.5	0.6	7.3	12.0	1.2	1.0	3.9	5.2	0.2	(2)
(3)	—silage.....	22.3	0.9	12.6	12.7	2.4	2.1	6.9	10.0	0.9	(3)
(4)	—silage.....	15.3	0.9	8.2	7.9	1.9	1.6	4.3	7.0	0.5	(4)
(5)	—silage, prebloom.....	26.2	1.4	13.0	8.6	2.6	2.7	8.5	11.7	0.7	(5)
(6)	—silage, early bloom.....	(21.8)	1.2	10.7	7.7	3.1	2.1	7.7	8.3	0.6	(6)
(7)	—silage, half bloom.....	21.2	1.1	12.9	10.7	2.1	2.0	6.3	9.5	1.3	(7)
(8)	—silage, full bloom.....	16.1	1.0	10.3	8.9	2.0	1.5	4.1	8.0	0.5	(8)
(9)	—silage, dough stage.....	22.1	1.0	12.5	11.5	2.2	1.7	6.5	10.0	1.7	(9)
(10)	—seed oil meal, with hulls	90.6	14.5	28.9	1.0	5.7	17.9	38.4	27.9	0.7	(10)
(11)	—seed oil meal, hulls, removed.....	89.5	31.0	77.0	1.5	6.4	34.0	14.9	20.8	13.4	(11)
(12)	Sunflower fodder, Jerusalem-artichoke, dry.....	92.9	3.3	55.3	15.9	10.3	8.0	16.5	56.7	1.4	(12)
(13)	—top silage.....	27.8	1.1	18.0	16.3	2.3	1.1	5.9	18.2	0.3	(13)
(14)	Sweetclover hay, all expts..	82.6	9.2	43.3	3.7	7.8	12.9	26.8	33.3	1.8	(14)
(15)	—hay, 1st cutting, early bloom.....	82.5	10.1	41.4	3.1	8.7	13.4	32.0	26.9	1.5	(15)
(16)	—hay, 2d cutting, early bloom.....	82.6	11.6	44.5	2.8	6.1	15.3	29.9	29.9	1.4	(16)
(17)	Sweetclover, white, 1st year cutting.....	82.2	8.9	44.0	3.9	7.7	12.3	25.7	34.4	2.1	(17)
(18)	—hay, 2d year cutting, prebloom.....	80.5	8.2	40.9	4.0	7.4	12.2	27.3	32.1	1.5	(18)
(19)	—fed green.....	15.6	2.4	10.0	3.2	1.1	3.1	4.7	6.2	0.5	(19)
(20)	—prebloom, fed green....	14.5	2.5	9.3	2.8	0.7	3.1	3.9	6.3	0.5	(20)
(21)	—early bloom, fed green..	16.6	2.2	10.6	3.8	1.6	2.9	5.6	6.0	0.5	(21)
(22)	Sweetclover silage, prebloom	34.8	5.7	17.8	2.1	3.4	7.5	12.4	10.4	1.1	(22)
(23)	Sweetclover oat straw mixed silage, prebloom.....	22.0	1.6	7.5	3.6	2.2	3.1	9.1	6.6	1.0	(23)
(24)	Sweetclover wheat mixed hay.....	85.2	3.7	46.8	11.6	5.9	6.9	28.8	42.3	1.3	(24)
(25)	—mixed silage.....	30.8	1.8	17.5	9.0	2.5	2.9	11.0	13.6	0.8	(25)
(26)	Sweetgrass hay.....	90.0	7.2	54.1	6.5	8.4	10.6	32.1	36.7	2.2	(26)
(27)	Sweetpotato vines, dry.....	87.7	4.0	46.0	10.4	9.9	10.3	25.3	39.1	3.1	(27)
(28)	—vine silage.....	12.1	0.6	5.8	8.2	1.4	1.6	3.5	5.1	0.5	(28)
(29)	Tankage.....	86.8	55.3	68.6	0.2	8.2	66.7	1.5	3.3	7.1	(29)
(30)	—glue or "stick".....	90.1	60.1	60.1	0	15.9	70.7	.....	3.1	0.4	(30)
(31)	—with horn meal.....	88.0	42.9	43.0	0	12.3	69.3	0.5	5.4	0.5	(31)
(32)	—absorbed on treated sawdust, dried.....	95.0	19.6	73.3	2.7	7.3	28.0	27.9	14.9	16.9	(32)
(33)	—absorbed on speltz chaff, dried.....	84.5	11.2	29.2	1.6	7.8	14.8	23.0	36.9	2.0	(33)
(34)	Teff hay.....	92.6	5.0	54.0	9.7	6.2	8.7	31.3	45.4	1.0	(34)
(35)	—hay, postbloom.....	93.2	6.0	54.2	8.1	4.9	9.8	31.9	45.6	1.0	(35)
(36)	—hay, overripe.....	92.2	4.4	53.6	11.0	7.0	7.9	31.0	45.3	1.0	(36)
(37)	—grass, fed green.....	34.2	0.8	19.7	23.2	3.3	1.8	14.1	14.4	0.6	(37)
(38)	Tetragonia, bush, fed green..	(20.0)	2.8	9.9	2.5	3.2	3.7	5.5	7.0	0.6	(38)
(39)	Tillandsia, treebeard, dry...	91.4	-0.3	51.5	.....	9.1	4.8	27.1	48.0	2.4	(39)
(40)	Timothy hay, all expts....	88.0	3.3	48.8	13.8	5.3	7.0	29.3	43.9	2.5	(40)
(41)	—hay.....	90.8	1.4	48.7	34.3	4.5	6.0	29.9	48.0	2.4	(41)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
							%	%						%	
( 1 )	62	47	51	72	67	10	3.3	56.7	10.5	7.0	34.7	46.2	1.6	( 1 )	
( 2 )	71	59	56	82	65	1	4.9	63.6	10.5	8.3	34.2	45.5	1.5	( 2 )	
( 3 )	60	45	51	68	66	14	4.1	56.7	10.6	9.2	30.8	45.3	4.1	( 3 )	
( 4 )	59	57	40	68	69	14	6.0	53.6	12.3	10.6	28.2	45.4	3.5	( 4 )	
( 5 )	53	51	42	60	66	3	5.2	49.7	10.0	10.2	32.6	44.4	2.8	( 5 )	
( 6 )	56	59	43	67	48	1	5.7	49.2	14.3	9.6	35.5	37.9	2.7	( 6 )	
( 7 )	61	54	47	70	77	3	5.2	60.8	9.9	9.6	29.5	45.1	5.9	( 7 )	
( 8 )	69	67	56	74	94	2	6.4	63.7	12.6	9.6	25.2	49.5	3.1	( 8 )	
( 9 )	53	58	38	58	82	2	4.5	56.5	9.8	7.8	29.5	45.0	7.9	( 9 )	
(10)	34	81	6	43	71	1	16.0	31.9	6.3	19.8	42.4	30.7	0.8	(10)	
(11)	75	91	23	71	90	6	34.6	86.0	7.2	38.0	16.7	23.1	15.0	(11)	
(12)	67	41	37	78	53	6	3.5	59.5	11.1	8.6	17.8	61.0	1.5	(12)	
(13)	66	99	44	78	29	1	3.8	64.9	8.4	3.8	21.1	65.5	1.2	(13)	
(14)	55	71	42	65	32	30	11.1	52.4	9.5	15.6	32.5	40.2	2.2	(14)	
(15)	55	75	42	63	37	1	12.2	50.2	10.5	16.3	38.8	32.6	1.8	(15)	
(16)	57	76	40	67	28	2	14.1	53.9	7.4	18.5	36.2	36.2	1.7	(16)	
(17)	58	72	42	65	41	12	10.8	53.5	9.4	15.0	31.3	41.7	2.6	(17)	
(18)	50	67	44	62	23	12	10.2	50.8	9.2	15.2	33.9	39.8	1.9	(18)	
(19)	67	78	58	69	51	4	15.3	64.0	7.1	19.6	30.0	40.1	3.2	(19)	
(20)	65	79	50	63	52	2	17.0	64.1	4.6	21.5	26.8	43.7	3.4	(20)	
(21)	69	77	66	69	50	2	13.3	64.0	9.6	17.3	33.8	36.4	2.9	(21)	
(22)	54	76	37	57	63	3	16.3	51.2	9.7	21.5	35.7	29.8	3.3	(22)	
(23)	35	52	42	13	55	2	7.4	34.3	10.0	14.2	41.2	30.0	4.6	(23)	
(24)	58	54	48	66	46	6	4.4	54.9	6.9	8.1	33.8	49.7	1.5	(24)	
(25)	60	60	54	64	63	6	5.7	56.9	8.1	9.5	35.7	44.1	2.6	(25)	
(26)	64	68	68	62	46	4	8.0	60.1	9.3	11.8	35.7	40.8	2.4	(26)	
(27)	57	39	56	61	57	8	4.6	52.4	11.3	11.8	28.8	44.6	3.5	(27)	
(28)	52	40	56	50	60	6	5.3	48.3	11.5	13.2	29.0	42.0	4.3	(28)	
(29)	32	33	8	19	78	8	63.7	79.0	9.4	76.8	1.7	3.9	8.2	(29)	
(30)	32	85	..	..	..	3	66.7	66.7	17.7	78.5	..	3.4	0.4	(30)	
(31)	55	62	..	..	12	7	48.8	48.9	14.0	78.7	0.6	6.1	0.6	(31)	
(32)	57	70	36	43	98	2	20.6	77.2	7.7	29.5	29.4	15.6	17.8	(32)	
(33)	36	76	13	36	35	2	13.3	34.5	9.2	17.5	27.2	43.7	2.4	(33)	
(34)	62	58	70	58	32	15	5.4	58.3	6.7	9.4	33.8	49.0	1.1	(34)	
(35)	61	61	67	58	23	6	6.4	58.2	5.3	10.5	34.2	48.9	1.1	(35)	
(36)	62	56	71	58	33	9	4.8	58.1	7.6	8.6	33.6	49.1	1.1	(36)	
(37)	61	44	66	62	50	6	2.4	57.6	9.6	5.4	41.3	41.9	1.8	(37)	
(38)	56	76	20	74	59	8	14.1	49.3	16.0	18.6	27.6	35.0	2.8	(38)	
(39)	63	-6	52	77	16	2	-0.3	56.4	10.0	5.3	29.6	52.5	2.6	(39)	
(40)	58	47	55	61	47	74	3.8	55.5	6.0	8.0	33.3	49.9	2.8	(40)	
(41)	55	23	44	65	55	17	1.5	53.6	5.0	6.6	32.9	52.9	2.6	(41)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Timothy hay, prebloom....	83.4	6.2	56.1	8.1	5.8	9.6	28.7	37.5	1.8	(1)
(2)	—hay, early bloom.....	88.7	3.5	48.7	12.7	6.1	6.6	32.6	41.6	1.8	(2)
(3)	—hay, half bloom.....	85.0	5.6	50.7	8.1	5.7	9.2	28.8	38.7	2.6	(3)
(4)	—hay, full bloom.....	90.3	3.9	53.6	12.7	4.6	7.2	31.7	43.4	3.4	(4)
(5)	—hay, late bloom.....	88.4	2.7	50.3	17.1	3.7	6.5	27.9	47.5	2.8	(5)
(6)	—hay, postbloom.....	84.3	3.3	44.9	12.7	4.8	6.8	29.0	41.4	2.3	(6)
(7)	—hay, overripe.....	80.1	1.6	38.7	22.5	4.4	5.0	24.6	43.9	2.2	(7)
(8)	—hay, "late cut".....	90.3	2.5	46.1	17.3	4.4	6.1	30.3	46.2	3.3	(8)
(9)	—meal.....	91.5	2.5	49.9	19.1	4.4	5.8	29.5	49.5	2.3	(9)
(10)	—fed green.....	28.1	0.7	14.9	20.2	1.7	1.8	9.7	13.9	1.0	(10)
(11)	—prebloom, fed green....	28.3	1.4	16.2	10.6	1.9	2.6	9.5	13.2	1.1	(11)
(12)	—late bloom, fed green....	27.7	0.6	14.9	23.5	1.6	1.5	9.8	13.9	0.9	(12)
(13)	—postbloom, fed green....	28.3	0.3	13.4	46.0	1.4	1.2	9.7	15.0	1.0	(13)
(14)	—seed, wild.....	86.0	10.9	50.6	3.6	3.1	18.6	6.3	54.9	3.1	(14)
(15)	Timothy grass weeds mixed hay.....	85.0	3.8	48.1	11.6	5.1	7.5	26.9	43.2	2.3	(15)
(16)	—mixed hay, prebloom....	81.9	3.8	54.2	13.0	4.8	7.0	27.7	40.7	1.7	(16)
(17)	—mixed hay, half bloom....	85.0	6.5	49.6	6.6	3.4	11.2	24.9	42.1	3.4	(17)
(18)	—mixed hay, postbloom....	85.0	4.6	42.6	8.4	4.0	8.4	24.6	44.6	3.4	(18)
(19)	—mixed hay, 2d or 3d cutting.....	82.3	3.3	47.0	13.4	4.4	7.4	29.7	38.6	2.2	(19)
(20)	—mixed hay, 2d cutting, early bloom.....	83.3	2.4	48.0	19.0	4.0	6.0	30.7	41.1	1.5	(20)
(21)	—mixed hay, 3d cutting, late bloom.....	80.9	1.5	41.3	27.7	3.0	4.8	32.5	39.3	1.3	(21)
(22)	Tobosa hay.....	93.4	0.7	40.9	55.2	10.0	3.6	32.8	45.9	1.1	(22)
(23)	Trefoil hay, birdsfoot.....	86.8	9.8	47.9	3.9	7.6	14.2	25.7	37.6	1.7	(23)
(24)	Tripteris fodder, Thickwing, dry.....	(87.0)	11.0	48.4	3.4	14.5	14.3	15.7	39.5	3.0	(24)
(25)	Turnip tops, dried.....	(87.7)	9.9	51.9	4.2	21.4	13.2	10.2	41.5	1.4	(25)
(26)	—roots.....	10.5	0.8	8.6	9.9	0.9	1.2	1.0	7.3	0.1	(26)
(27)	—roots, English flat.....	9.8	1.0	8.9	8.0	0.9	1.1	1.0	6.4	0.4	(27)
(28)	—tops, fed green.....	13.4	0.8	9.5	10.7	2.1	2.1	1.7	7.2	0.3	(28)
(29)	—top silage.....	18.2	1.9	12.8	5.6	4.4	2.7	3.1	7.4	0.6	(29)
(30)	Twigs, acacia, dry.....	87.6	5.5	32.2	4.9	3.6	9.8	31.5	41.0	1.7	(30)
(31)	—beech, dry.....	85.4	0.3	19.0	68.8	2.0	3.9	36.6	41.5	1.4	(31)
(32)	—poplar, dry.....	76.4	2.3	30.7	12.2	3.0	6.0	30.3	34.5	2.6	(32)
(33)	Urea.....	98.9	98.8	98.8	0	0.1	98.8	.....	.....	.....	(33)
(34)	Velvetbean hay, postbloom....	62.3	5.5	36.7	5.6	6.5	9.6	24.9	19.9	1.4	(34)
(35)	—vines, fed green.....	19.9	2.3	13.8	5.1	1.2	3.2	6.3	8.5	0.7	(35)
(36)	—vines, full bloom, fed green.....	19.2	2.1	13.0	5.1	1.1	3.0	6.6	7.7	0.8	(36)
(37)	—vines, dough stage, fed green.....	20.9	2.4	14.9	5.3	1.4	3.4	5.9	9.7	0.5	(37)
(38)	—seed.....	88.5	18.6	79.4	3.3	2.7	22.9	8.1	50.9	3.9	(38)
(39)	—seeds and pods.....	88.2	12.6	74.4	4.9	4.9	16.8	12.8	49.5	4.2	(39)
(40)	Vetch, bitter, early bloom, fed green.....	17.8	2.9	10.5	2.7	4.6	3.5	3.7	5.4	0.6	(40)
(41)	Vetch hay, common.....	85.6	14.9	52.1	2.5	8.4	19.1	23.6	32.7	1.8	(41)
(42)	—hay.....	87.8	24.8	78.8	2.2	3.3	28.3	3.1	51.9	1.2	(42)
(43)	—hay, early bloom.....	83.0	14.7	48.8	2.3	9.3	19.3	23.7	28.5	2.2	(43)
(44)	—hay, full bloom.....	85.6	11.3	13.3	2.8	7.9	15.9	30.8	29.5	1.5	(44)



## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
							%	%						%	
(1)	71	64	75	71	44	3	7.4	67.3	6.9	11.5	34.4	45.0	2.2	(1)	
(2)	57	54	57	60	40	9	4.0	54.9	6.9	7.4	36.8	46.9	2.0	(2)	
(3)	63	61	57	65	62	6	6.6	59.7	6.7	10.8	33.9	45.6	3.0	(3)	
(4)	60	54	58	62	58	3	4.3	59.4	5.1	8.0	35.1	48.0	3.8	(4)	
(5)	58	43	52	63	48	4	3.1	56.9	4.2	7.3	31.6	53.7	3.2	(5)	
(6)	55	48	50	59	54	14	3.9	53.3	5.7	8.1	34.4	49.1	2.7	(6)	
(7)	49	33	45	56	27	2	2.0	48.3	5.5	6.2	30.7	54.9	2.7	(7)	
(8)	51	41	41	58	60	2	2.8	51.1	4.9	6.8	33.6	51.0	3.7	(8)	
(9)	56	43	56	59	32	4	2.7	54.5	4.8	6.3	32.2	54.2	2.5	(9)	
(10)	54	39	51	57	59	6	2.5	53.1	5.9	6.4	34.4	49.7	3.6	(10)	
(11)	59	54	59	59	65	1	5.0	58.0	6.8	9.3	33.5	46.4	4.0	(11)	
(12)	55	40	54	58	48	1	2.2	53.8	5.9	5.5	35.3	50.0	3.3	(12)	
(13)	47	23	39	53	65	2	1.0	47.4	5.1	4.4	34.3	52.7	3.5	(13)	
(14)	58	59	17	64	48	2	12.7	58.8	3.6	21.6	7.3	63.9	3.6	(14)	
(15)	58	51	55	62	52	21	4.5	56.6	6.0	8.8	31.6	50.9	2.7	(15)	
(16)	69	55	70	71	55	12	4.7	66.2	5.9	8.6	33.8	49.6	2.1	(16)	
(17)	58	58	55	59	59	2	7.7	58.3	4.0	13.2	29.3	49.5	4.0	(17)	
(18)	50	54	47	49	60	2	5.4	50.1	4.7	9.9	29.0	52.4	4.0	(18)	
(19)	59	44	59	62	45	30	4.0	57.1	5.3	9.0	36.1	46.9	2.7	(19)	
(20)	60	40	59	63	46	17	2.9	57.6	4.8	7.2	36.8	49.4	1.8	(20)	
(21)	52	30	50	57	39	8	1.8	51.0	3.7	5.9	40.2	48.6	1.6	(21)	
(22)	49	20	54	47	37	4	0.8	43.8	10.7	3.9	35.1	49.1	1.2	(22)	
(23)	60	69	48	64	43	1	11.3	55.2	8.7	16.4	29.6	43.3	2.0	(23)	
(24)	67	77	4	93	0	4	12.6	55.6	16.7	16.4	18.1	45.4	3.4	(24)	
(25)	78	75	72	81	34	2	11.3	59.2	24.4	15.1	11.6	47.3	1.6	(25)	
(26)	92	64	91	94	54	5	7.6	82.0	9.0	11.8	9.7	68.6	0.9	(26)	
(27)	96	90	103	96	88	2	10.2	91.2	9.4	11.3	10.4	64.8	4.1	(27)	
(28)	96	38	96	93	64	4	6.0	70.8	16.0	15.9	12.6	53.5	2.0	(28)	
(29)	88	72	98	88	100	4	10.7	70.5	24.0	14.8	17.0	41.1	3.1	(29)	
(30)	38	56	21	47	23	2	6.3	36.8	4.1	11.2	36.0	46.8	1.9	(30)	
(31)	24	7	12	34	10	8	0.3	22.3	2.4	4.6	42.8	48.6	1.6	(31)	
(32)	40	39	28	51	39	3	3.0	40.2	3.9	7.8	39.7	45.2	3.4	(32)	
(33)	100	100	..	..	..	1	99.9	99.9	0.1	99.9	..	..	..	(33)	
(34)	65	58	68	61	66	4	8.9	58.9	10.5	15.4	40.0	31.9	2.2	(34)	
(35)	72	71	58	80	68	14	11.4	69.2	6.1	16.0	31.7	42.8	3.4	(35)	
(36)	69	71	57	77	67	8	11.1	67.8	5.8	15.6	34.5	39.9	4.2	(36)	
(37)	76	70	59	85	70	6	11.5	71.4	6.5	16.4	28.0	46.8	2.4	(37)	
(38)	89	81	72	97	64	2	21.0	89.7	3.0	25.9	9.2	57.5	4.4	(38)	
(39)	83	75	74	89	86	6	14.3	84.3	5.5	19.1	14.5	56.1	4.8	(39)	
(40)	76	82	55	86	71	3	16.1	58.8	26.0	19.6	20.7	30.5	3.2	(40)	
(41)	66	78	50	72	46	24	17.4	60.9	9.8	22.3	27.6	38.2	2.1	(41)	
(42)	92	88	-10	100	87	2	28.3	89.8	3.8	32.2	3.5	59.1	1.4	(42)	
(43)	64	76	55	65	52	7	17.7	58.8	11.2	23.3	28.6	34.2	2.7	(43)	
(44)	56	71	47	60	-4	1	13.2	50.6	9.2	18.6	36.0	34.4	1.8	(44)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Vetch hay, dough stage . . .	85.1	8.0	42.0	4.3	7.9	12.9	30.4	32.4	1.5	(1)
(2)	—fed green . . . . .	22.2	3.4	13.2	2.8	2.2	4.6	6.1	8.8	0.5	(2)
(3)	—prebloom, fed green . . .	22.3	3.5	13.1	2.7	2.3	4.6	6.2	8.7	0.5	(3)
(4)	Vetch hay, hairy . . . . .	89.6	17.0	58.2	2.4	9.1	21.5	27.4	28.3	3.3	(4)
(5)	—fed green . . . . .	18.7	3.8	13.2	2.5	1.8	4.6	5.5	6.0	0.8	(5)
(6)	Vetch, Narbonne, fed green	16.4	2.4	10.4	3.4	2.3	3.0	4.3	6.3	0.5	(6)
(7)	Vetch seed, black bitter . . .	90.1	18.0	79.6	3.4	3.8	22.0	9.0	54.5	0.8	(7)
(8)	Vetch grass mixed hay . . .	85.4	8.7	58.9	5.7	6.1	12.5	17.3	45.7	3.8	(8)
(9)	—mixed hay, dehydrated . .	91.8	17.3	57.8	2.4	13.5	22.1	20.5	32.4	3.3	(9)
(10)	Vetch, hairy, winter wheat mixed hay, prebloom (Goats) . . . . .	87.2	10.3	56.3	4.5	6.5	14.0	29.0	35.7	2.0	(10)
(11)	—mixed fodder, prebloom, fed green (Goats) . . .	18.5	2.4	12.4	4.2	1.6	3.2	5.6	7.6	0.5	(11)
(12)	Vetch mixture silage . . . .	16.1	2.0	10.5	4.2	2.1	2.6	4.4	6.2	0.8	(12)
(13)	—mixture silage, H <sub>2</sub> SO <sub>4</sub> added . . . . .	16.1	1.9	9.3	3.9	2.1	2.6	4.4	6.2	0.8	(13)
(14)	Watergrass hay . . . . .	94.2	3.8	39.3	9.3	18.0	7.6	31.2	36.3	1.1	(14)
(15)	Walnut meal, hulls removed	91.2	38.0	88.8	1.3	5.3	41.8	6.2	29.1	8.8	(15)
(16)	—meal, with hulls . . . . .	91.7	17.9	57.3	2.2	4.6	21.3	23.3	29.2	8.3	(16)
(17)	Whale meal, solvent extracted	90.2	76.7	80.4	0	3.9	83.3	.....	1.4	1.6	(17)
(18)	—meal, partially extracted	91.0	74.2	84.3	0.1	3.5	80.6	.....	2.0	4.9	(18)
(19)	—meal, high fat . . . . .	91.8	48.9	98.7	1.0	2.7	65.3	.....	2.0	21.8	(19)
(20)	—meal and bone meal . . .	90.5	34.7	60.0	0.7	23.0	53.4	.....	2.2	11.9	(20)
(21)	Wheat hay . . . . .	83.2	3.7	43.5	10.8	5.5	6.8	22.3	46.9	1.7	(21)
(22)	—hay, milk stage . . . . .	84.3	4.5	43.5	8.8	5.4	7.7	20.0	49.6	1.6	(22)
(23)	—hay, dough stage . . . . .	82.5	3.3	42.6	11.8	5.4	6.5	23.7	45.0	1.9	(23)
(24)	—hay, mature . . . . .	83.4	3.8	46.5	11.5	5.6	6.8	21.7	48.0	1.3	(24)
(25)	—chaff . . . . .	93.2	2.5	32.3	11.8	20.1	5.5	23.1	38.1	1.4	(25)
(26)	—straw . . . . .	83.7	0.2	38.1	161.4	5.1	2.9	41.2	33.2	1.3	(26)
(27)	—straw . . . . .	86.2	-1.0	31.8	.....	4.4	2.4	33.4	39.5	1.5	(27)
(28)	—straw, winter . . . . .	85.4	0	29.4	.....	8.9	1.3	31.1	42.9	1.3	(28)
(29)	—straw, winter . . . . .	82.2	0.3	36.3	99.5	5.4	3.3	33.6	38.3	1.6	(29)
(30)	—straw, winter, steamed . .	78.4	0.3	43.2	152.1	9.9	3.5	27.7	34.6	2.7	(30)
(31)	—straw, winter, treated with NaOH, dry . . . . .	74.2	-1.4	39.7	.....	7.9	2.6	35.2	27.3	1.2	(31)
(32)	—grain, all expts . . . . .	83.2	10.0	77.3	6.7	2.9	12.9	2.9	68.6	1.9	(32)
(33)	—grain, cooked . . . . .	87.7	14.7	71.7	3.9	2.1	13.4	3.6	61.2	2.4	(33)
(34)	—grain, light, shrunken . .	86.2	13.0	72.1	4.5	2.5	16.3	4.1	61.4	1.9	(34)
(35)	—grain, under 14% moisture . . . . .	88.6	9.9	77.8	6.8	1.9	12.9	3.0	68.9	1.9	(35)
(36)	—grain, tough, 14.5-15.5% moisture . . . . .	85.2	10.3	74.5	6.2	1.7	12.3	2.4	67.4	1.4	(36)
(37)	—grain, 8% protein . . . .	87.4	5.9	76.6	12.1	1.7	8.7	2.6	72.0	2.4	(37)
(38)	—grain, 11% protein . . . .	87.0	9.8	76.7	6.8	1.7	12.1	2.5	68.7	2.0	(38)
(39)	—grain, 13% protein . . . .	90.0	10.5	81.2	6.7	1.9	13.5	3.1	69.9	1.6	(39)
(40)	—grain, 16% protein . . . .	86.9	13.9	71.6	4.2	2.3	17.4	3.8	61.3	2.1	(40)
(41)	—grain, durum . . . . .	88.0	9.7	77.0	7.0	1.7	12.4	3.1	68.2	2.6	(41)
(42)	—grain, soft red winter . .	88.7	8.9	78.2	7.8	1.7	11.8	2.9	70.3	2.0	(42)
(43)	—grain, white . . . . .	87.8	9.4	78.2	7.3	1.7	11.5	2.1	70.6	1.9	(43)
(44)	—bran, all expts . . . . .	87.4	11.4	58.3	4.1	5.5	15.3	9.2	53.2	4.2	(44)
(45)	—bran (Goats) . . . . .	89.4	10.5	63.9	5.1	6.1	13.8	11.4	52.7	5.4	(45)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ethe ex-tract		
							%	%							
(1)	54	62	45	62	7	1	9.4	49.3	9.3	15.1	35.7	38.1	1.8	(1)	
(2)	65	75	40	76	49	12	15.4	59.3	9.8	20.6	27.4	39.9	2.3	(2)	
(3)	64	76	40	76	47	10	15.8	58.9	10.2	20.8	27.7	39.1	2.2	(3)	
(4)	69	79	59	71	67	8	19.0	64.9	10.2	24.0	30.6	31.5	3.7	(4)	
(5)	74	83	63	76	73	12	20.3	70.5	9.4	24.5	29.2	32.7	4.2	(5)	
(6)	70	80	58	74	74	4	14.4	63.7	13.8	18.0	26.1	38.9	3.2	(6)	
(7)	92	82	94	95	76	4	20.0	88.4	4.2	24.4	10.0	60.5	0.9	(7)	
(8)	70	70	60	75	65	2	10.2	69.0	7.2	14.6	20.3	53.5	4.4	(8)	
(9)	70	78	52	76	71	2	18.8	63.0	14.7	24.1	22.3	35.3	3.6	(9)	
(10)	68	74	65	68	64	4	11.8	64.6	7.5	16.0	33.2	41.0	2.3	(10)	
(11)	71	74	68	73	57	4	13.0	66.8	8.8	17.5	30.1	40.7	2.9	(11)	
(12)	71	77	58	79	59	11	12.6	65.0	13.2	16.3	27.5	38.3	4.7	(12)	
(13)	66	72	49	80	16	1	11.7	57.5	13.2	16.3	27.5	38.3	4.7	(13)	
(14)	51	50	58	46	27	1	4.0	41.7	19.1	8.1	33.1	38.5	1.2	(14)	
(15)	89	91	37	100	98	2	41.7	97.4	5.8	45.8	6.8	32.0	9.6	(15)	
(16)	53	84	14	59	98	2	19.5	62.5	5.0	23.2	30.9	31.9	9.0	(16)	
(17)	91	92	..	-5	103	2	85.0	89.1	4.3	92.4	.....	1.5	1.8	(17)	
(18)	90	92	..	-38	98	2	81.5	92.6	3.9	88.6	.....	2.1	5.4	(18)	
(19)	87	75	..	36	100	2	53.3	107.5	2.9	71.1	.....	2.3	23.7	(19)	
(20)	63	65	..	..	95	2	38.4	66.3	25.4	59.0	.....	2.5	13.1	(20)	
(21)	56	54	41	62	42	20	4.4	52.3	6.6	8.2	26.8	56.4	2.0	(21)	
(22)	54	58	34	62	40	5	5.3	51.6	6.4	9.1	23.7	58.9	1.9	(22)	
(23)	55	51	42	61	44	12	4.0	51.6	6.6	7.9	28.7	54.5	2.3	(23)	
(24)	59	55	47	65	43	5	4.5	55.7	6.7	8.1	26.0	57.6	1.6	(24)	
(25)	42	46	33	44	121	4	2.7	34.7	21.6	5.9	30.2	40.8	1.5	(25)	
(26)	48	8	59	37	44	2	0.3	45.5	6.1	3.5	49.2	39.7	1.5	(26)	
(27)	41	-41	42	42	-3	4	-1.2	36.9	5.1	2.8	44.6	45.8	1.7	(27)	
(28)	37	0	28	44	61	6	0	34.4	10.4	1.5	36.4	50.2	1.5	(28)	
(29)	47	11	49	47	43	12	0.4	44.2	6.6	4.0	40.9	46.6	1.9	(29)	
(30)	60	8	60	64	69	4	0.4	55.1	12.6	4.5	35.3	44.2	3.4	(30)	
(31)	61	-54	66	62	34	5	-1.9	53.5	10.6	3.5	47.5	36.8	1.6	(31)	
(32)	88	78	33	92	72	16	11.4	87.6	2.1	14.6	3.3	77.8	2.2	(32)	
(33)	82	80	40	84	78	1	16.8	81.8	2.4	21.0	4.1	69.8	2.7	(33)	
(34)	85	80	33	89	74	1	15.1	83.7	2.9	18.9	4.8	71.2	2.2	(34)	
(35)	88	77	44	92	72	14	11.2	87.8	2.1	14.6	3.4	77.7	2.2	(35)	
(36)	87	84	-46	93	78	2	12.1	87.4	2.0	14.4	2.8	79.1	1.7	(36)	
(37)	87	67	7	92	80	2	6.7	87.7	1.9	10.0	3.0	82.3	2.3	(37)	
(38)	88	81	-2	93	69	6	11.3	88.2	1.9	13.9	2.9	79.0	2.3	(38)	
(39)	90	78	75	93	92	6	11.7	90.2	2.1	15.0	3.4	77.7	1.8	(39)	
(40)	83	80	37	86	76	2	16.0	82.4	2.6	20.0	4.4	70.6	2.4	(40)	
(41)	87	78	24	92	65	2	11.0	87.5	1.9	14.1	3.5	77.6	2.9	(41)	
(42)	88	75	47	92	75	6	10.0	88.2	1.9	13.3	3.3	79.3	2.2	(42)	
(43)	89	82	17	93	64	2	10.7	89.1	1.9	13.1	2.4	80.4	2.2	(43)	
(44)	68	75	36	72	55	49	13.1	66.7	6.3	17.5	10.5	60.9	4.8	(44)	
(45)	72	76	60	75	58	2	11.7	71.5	6.8	15.4	12.8	59.0	6.0	(45)	

TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Wheat bran, "country mill".....	87.8	12.3	65.8	4.3	5.6	15.8	7.8	53.6	4.0	(1)
(2)	—bran, spring.....	90.5	12.4	61.7	4.0	6.1	16.1	10.8	52.6	4.9	(2)
(3)	—bran, winter.....	86.4	10.9	57.3	4.3	6.2	13.9	8.8	53.3	4.2	(3)
(4)	—bran, molasses and urea added.....	83.8	46.5	73.5	0.6	5.3	48.9	7.5	19.9	2.2	(4)
(5)	—bran and screenings....	87.6	7.2	57.7	7.0	5.0	11.4	12.8	54.4	4.0	(5)
(6)	—brown shorts.....	90.6	16.1	77.7	3.8	4.2	19.0	5.8	56.3	5.3	(6)
(7)	—flour middlings.....	87.6	14.8	72.9	3.9	2.6	18.3	4.3	58.4	4.0	(7)
(8)	—germ oil meal.....	86.0	26.1	80.2	2.1	4.5	27.7	1.9	45.2	6.7	(8)
(9)	—germ oil meal, commercial, German.....	87.8	16.5	84.1	4.1	3.7	19.1	3.8	56.0	5.2	(9)
(10)	—gluten feed.....	89.0	16.0	79.9	4.0	3.6	18.2	6.0	56.8	4.4	(10)
(11)	—gray shorts.....	90.7	16.3	80.6	3.9	3.9	19.4	4.7	57.6	5.1	(11)
(12)	—standard middlings.....	85.2	11.6	62.4	4.4	6.0	14.9	8.9	50.7	4.7	(12)
(13)	—mixed feed.....	86.5	12.4	66.0	4.3	4.8	14.9	7.4	55.2	4.2	(13)
(14)	—red dog.....	86.7	12.8	74.4	4.8	3.2	18.0	2.3	58.8	4.3	(14)
(15)	—screenings.....	88.8	11.8	65.2	4.5	6.5	16.4	7.9	54.4	3.6	(15)
(16)	—white shorts.....	89.6	14.7	88.2	5.0	1.3	16.3	1.3	68.2	2.5	(16)
(17)	Wheatgrass hay, all expts..	90.8	3.6	49.8	12.5	7.3	7.4	31.3	42.4	2.4	(17)
(18)	—hay, under 30% fiber..	92.0	3.6	54.7	14.2	7.4	6.9	29.0	45.9	2.8	(18)
(19)	—hay, over 30% fiber..	89.8	3.7	44.8	11.2	7.1	7.8	33.6	39.2	2.1	(19)
(20)	Wheatgrass hay, bearded bluebunch, overripe..	88.9	0.2	35.4	197.8	10.3	3.0	31.1	40.9	3.6	(20)
(21)	Wheatgrass hay, bluestem bunch, 3-5 inches high, fed green.....	32.5	5.3	23.4	3.4	3.3	6.8	8.1	13.0	1.3	(21)
(22)	—7-10 inches high, fed green.....	31.8	4.0	22.1	4.6	3.3	5.2	9.0	13.0	1.3	(22)
(23)	—overripe, fed green....	45.5	2.6	29.0	10.1	3.5	4.1	15.5	20.9	1.5	(23)
(24)	Wheatgrass hay, bluestem..	90.7	3.6	54.2	13.8	7.3	6.9	28.4	45.5	2.6	(24)
(25)	—hay, overripe.....	94.5	3.8	60.7	15.1	6.0	6.7	29.8	49.4	2.6	(25)
(26)	—hay, crested, early bloom.....	87.6	9.6	49.8	4.2	7.2	13.6	32.7	32.2	1.9	(26)
(27)	—hay, late bloom.....	89.8	1.7	43.0	24.1	5.7	4.8	34.0	43.8	1.5	(27)
(28)	—4 inches high, dried....	88.9	8.9	65.4	5.4	8.4	13.7	19.8	43.9	3.1	(28)
(29)	—10 inches high, dried....	93.4	3.8	59.8	14.5	6.6	8.0	27.7	48.9	2.2	(29)
(30)	—4 inches high, fed green	32.4	3.3	21.5	5.6	3.1	4.4	8.2	15.8	0.9	(30)
(31)	—10 inches high, fed green.....	36.6	1.8	24.5	12.6	2.9	3.0	10.3	19.6	0.8	(31)
(32)	Wheatgrass hay, slender....	93.8	4.5	54.2	11.0	7.0	7.4	35.5	41.8	2.1	(32)
(33)	Willows, fed green.....	41.0	1.2	22.7	18.5	3.0	4.0	11.2	20.8	2.0	(33)
(34)	Wood cellulose, treated with NaOH, dry.....	91.6	-1.7	76.1	.....	0.8	0.5	80.2	9.9	0.2	(34)
(35)	—treated with Na <sub>2</sub> S, dry..	91.9	-1.8	75.1	.....	0.7	0.4	75.0	15.3	0.5	(35)
(36)	—treated with Na <sub>2</sub> S, dry (Goats).....	80.2	0	70.3	.....	1.2	0.1	63.2	15.2	0.5	(36)
(37)	Wood sawdust, dry.....	88.7	-0.1	0.9	.....	3.5	0.9	57.6	26.1	0.6	(37)
(38)	—treated with HCl, dry....	93.8	0	32.4	.....	2.6	0.4	43.9	44.5	2.4	(38)
(39)	—treated with NaOH, dry..	67.8	-1.3	33.7	.....	3.6	0.7	45.8	17.4	0.3	(39)
(40)	—treated with H <sub>2</sub> SO <sub>4</sub> , dry..	85.9	-2.9	-18.1	.....	0.6	0.6	49.2	34.6	0.9	(40)
(41)	—treated with H <sub>2</sub> SO <sub>4</sub> , molasses added, dry.....	78.4	1.0	33.9	32.4	3.5	3.6	32.1	38.6	0.6	(41)

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
(1)	76	78	62	77	81	4	14.2	75.8	6.4	18.2	9.0	61.8	4.6	(1)	
(2)	69	77	50	72	55	5	13.7	68.2	6.7	17.8	11.9	58.2	5.4	(2)	
(3)	69	78	28	71	65	2	12.6	66.3	7.2	16.1	10.2	61.6	4.9	(3)	
(4)	87	95	66	89	89	2	55.5	87.7	6.3	58.4	9.0	23.7	2.6	(4)	
(5)	64	63	28	71	92	3	8.2	65.9	5.7	13.0	14.6	62.1	4.6	(5)	
(6)	84	85	60	85	85	6	17.8	85.8	4.6	21.0	6.4	62.1	5.9	(6)	
(7)	81	81	24	85	82	6	16.9	83.2	3.0	20.9	4.9	66.6	4.6	(7)	
(8)	89	94	-24	91	89	2	30.3	93.2	5.2	32.2	2.2	52.6	7.8	(8)	
(9)	94	86	42	98	96	2	18.8	95.8	4.2	21.8	4.3	63.8	5.9	(9)	
(10)	91	88	120	92	46	1	18.0	89.8	4.1	20.4	6.7	63.9	4.9	(10)	
(11)	86	84	54	89	92	6	18.0	88.9	4.3	21.4	5.2	63.5	5.6	(11)	
(12)	72	78	38	75	89	2	13.6	73.2	7.1	17.5	10.5	59.4	5.5	(12)	
(13)	76	83	34	78	86	4	14.3	76.3	5.6	17.2	8.5	63.9	4.8	(13)	
(14)	84	71	15	90	85	6	14.8	85.8	3.7	20.8	2.7	67.8	5.0	(14)	
(15)	74	72	6	84	88	10	13.3	73.4	7.3	18.5	8.9	61.2	4.1	(15)	
(16)	96	90	70	99	89	4	16.4	98.4	1.4	18.2	1.4	76.2	2.8	(16)	
(17)	59	50	62	58	39	32	4.0	54.9	8.0	8.1	34.5	46.8	2.6	(17)	
(18)	63	52	67	63	44	16	3.9	59.5	8.0	7.5	31.5	50.0	3.0	(18)	
(19)	54	47	56	53	34	16	4.1	49.9	7.9	8.7	37.4	43.7	2.3	(19)	
(20)	43	6	50	41	35	3	0.2	39.8	11.6	3.4	35.0	45.9	4.1	(20)	
(21)	46	79	78	76	64	3	16.4	72.1	10.2	20.8	24.8	40.1	4.1	(21)	
(22)	74	76	74	74	66	6	12.5	69.6	10.4	16.5	28.2	40.8	4.1	(22)	
(23)	67	64	68	68	48	4	5.8	63.7	7.8	9.0	34.1	45.7	3.4	(23)	
(24)	64	53	69	63	40	9	4.0	59.8	8.1	7.6	31.3	50.1	2.9	(24)	
(25)	67	56	70	68	42	3	4.0	64.2	6.4	7.1	31.5	52.2	2.8	(25)	
(26)	61	71	64	54	43	5	11.0	56.9	8.2	15.5	37.3	36.8	2.2	(26)	
(27)	51	36	51	53	20	6	1.9	47.9	6.3	5.3	37.9	48.8	1.7	(27)	
(28)	63	65	60	72	59	6	10.0	63.6	9.4	15.4	22.3	49.4	3.5	(28)	
(29)	67	48	68	70	57	6	4.1	64.0	7.1	8.6	29.7	52.2	2.4	(29)	
(30)	71	74	64	74	66	6	10.1	66.5	9.6	13.6	25.3	48.7	2.8	(30)	
(31)	71	60	68	75	53	6	4.9	66.9	7.9	8.2	28.1	53.6	2.2	(31)	
(32)	61	61	61	62	47	3	4.8	57.8	7.5	7.9	37.8	44.6	2.2	(32)	
(33)	55	29	42	66	70	2	2.8	55.4	7.4	9.8	27.2	50.7	4.9	(33)	
(34)	84	-380	93	50	-410	4	-1.9	83.1	0.9	0.5	87.6	10.8	0.2	(34)	
(35)	80	-504	92	55	-50	6	-2.0	81.7	0.8	0.4	81.6	16.7	0.5	(35)	
(36)	88	3	95	67	0	34	0	87.6	1.5	0.1	78.8	19.0	0.6	(36)	
(37)	-1	-7	0	3	10	8	-0.1	1.0	4.0	1.0	64.9	29.4	0.7	(37)	
(38)	35	0	10	63	0	12	0	34.5	2.8	0.4	46.8	47.4	2.6	(38)	
(39)	52	-188	64	31	42	1	-1.9	49.7	5.3	1.0	67.4	25.8	0.5	(39)	
(40)	20	-478	-6	65	73	2	-3.4	21.1	0.7	0.7	57.3	40.3	1.0	(40)	
(41)	44	28	0	81	107	2	1.3	43.1	4.5	4.6	40.9	49.2	0.8	(41)	



TABLE 2—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Wood sawdust residue after treatment with HCl, dry	95.5	0	11.2	.....	0.4	0.8	57.4	33.2	3.7	( 1 )
( 2 )	Wyethia fodder, wooly, dry	93.2	11.4	54.1	3.8	10.2	16.2	15.9	47.0	3.9	( 2 )
( 3 )	Yampa fodder, dry	93.2	4.1	61.6	14.1	9.0	7.2	25.7	46.5	4.8	( 3 )
( 4 )	Yeast, dried	89.6	40.9	67.6	0.6	7.0	48.2	1.2	31.3	1.9	( 4 )
( 5 )	Yeast, mineral	86.9	37.5	61.1	0.6	9.7	43.6	.....	28.2	5.4	( 5 )
( 6 )	Yeast, sulfite waste liquors, dried	91.6	36.8	59.1	0.6	9.1	42.9	2.1	36.0	1.5	( 6 )
( 7 )	—wood sugar	91.1	42.5	78.8	0.9	7.9	47.7	1.0	33.0	1.5	( 7 )
( 8 )	Yeast dried grains	92.4	12.1	60.8	4.0	2.4	18.8	18.6	46.5	6.1	( 8 )

## AND DIGESTIBILITY WITH SHEEP AND GOATS—(Concluded)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%	%	
( 1 )	11	0	9	18	0	6	0	11.7	0.4	0.8	60.1	34.8	3.9	( 1 )	
( 2 )	62	70	54	61	63	2	12.2	58.1	10.9	17.4	17.1	50.4	4.2	( 2 )	
( 3 )	68	57	74	65	77	2	4.4	66.1	9.7	7.7	27.6	49.9	5.1	( 3 )	
( 4 )	81	85	-105	88	7	23	45.7	75.5	7.8	53.8	1.3	35.0	2.1	( 4 )	
( 5 )	74	86	..	73	25	2	43.2	70.3	11.2	50.2	.....	32.4	6.2	( 5 )	
( 6 )	71	86	-76	62	44	5	40.2	64.5	9.9	46.8	2.3	39.4	1.6	( 6 )	
( 7 )	92	89	164	96	92	6	46.6	86.5	8.7	52.4	1.1	36.2	1.6	( 7 )	
( 8 )	60	64	58	56	87	4	13.1	65.8	2.6	20.4	20.1	50.3	6.6	( 8 )	



TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Alfalfa hay, all expts. ....	86.6	7.8	30.0	2.9	8.6	16.5	28.1	31.6	1.8	(1)
(2)	—hay, prebloom, dehydrated	90.1	13.1	45.0	2.4	10.5	21.4	26.7	28.9	2.6	(2)
(3)	—prebloom, fed green. ....	21.8	3.3	12.7	2.9	2.2	4.6	4.6	9.6	0.8	(3)
(4)	—meal. ....	86.6	7.4	29.1	2.9	8.5	16.3	28.3	31.7	1.8	(4)
(5)	Barley, grain, all expts. ....	86.4	8.3	69.9	7.5	2.6	10.7	4.6	66.6	1.9	(5)
(6)	—grain, all expts. ....	88.0	7.7	70.7	8.3	2.5	10.7	4.8	67.9	2.1	(6)
(7)	—grain, under 4% fiber. ....	88.0	8.4	71.8	7.6	2.6	11.2	3.6	68.7	1.9	(7)
(8)	—grain, under 4% fiber. ....	84.1	7.9	69.6	7.8	2.4	10.6	3.6	64.8	2.7	(8)
(9)	—grain, 4-6% fiber. ....	86.1	8.2	70.4	7.6	2.6	10.5	4.8	66.5	1.7	(9)
(10)	—grain, 4-6% fiber. ....	89.0	7.5	70.6	8.4	2.7	10.7	4.9	68.7	2.0	(10)
(11)	—grain, over 6% fiber. ....	87.5	8.8	67.1	6.6	2.8	11.9	6.9	63.5	2.4	(11)
(12)	—grain, over 6% fiber. ....	87.6	8.4	73.4	7.7	1.5	11.2	6.0	67.4	1.5	(12)
(13)	—grain, under 13.5% moisture. ....	88.8	8.8	70.4	7.0	2.9	11.9	5.1	66.9	2.0	(13)
(14)	—grain, under 13.5% moisture. ....	88.7	7.2	70.2	8.7	2.6	10.5	5.0	68.6	2.0	(14)
(15)	—grain, 13.5% - 14.5% moisture. ....	86.0	8.6	69.7	7.1	2.3	11.0	4.5	66.6	1.6	(15)
(16)	—grain, 13.5-16% moisture. ....	84.6	8.5	68.5	7.1	2.4	11.0	4.2	64.6	2.4	(16)
(17)	—grain, 14.5-16% moisture. ....	84.8	8.1	70.6	7.7	2.5	10.1	4.3	65.8	2.1	(17)
(18)	—grain, sample grade, over 16% moisture. ....	83.2	8.0	69.5	7.7	2.5	10.3	4.2	64.4	1.8	(18)
(19)	—grain, under 10% protein. ....	85.7	6.9	70.8	9.2	2.6	9.0	4.3	68.0	1.8	(19)
(20)	—grain, 10% protein. ....	86.0	8.4	70.7	7.3	2.8	10.6	4.2	66.4	2.0	(20)
(21)	—grain, under 11% protein. ....	87.1	7.7	71.0	8.3	2.8	9.7	4.8	67.8	2.0	(21)
(22)	—grain, 11% protein. ....	86.3	9.1	69.6	6.6	2.4	11.7	4.9	65.5	1.8	(22)
(23)	—grain, 11% protein. ....	88.4	7.5	70.0	8.3	2.4	11.2	4.8	67.9	2.1	(23)
(24)	—grain, 14% protein. ....	90.2	11.2	69.5	5.2	2.9	14.7	4.6	65.7	2.3	(24)
(25)	—grain, high protein, N fertilized. ....	83.3	9.3	70.2	6.5	2.7	12.3	4.0	62.5	1.8	(25)
(26)	—grain, cooked. ....	85.3	6.4	66.5	9.4	2.2	9.6	6.7	66.0	0.8	(26)
(27)	—grain, hull-less or bald. ....	84.6	8.8	71.5	7.1	2.0	12.2	1.9	66.6	1.9	(27)
(28)	—grain, hull-less or bald, N fertilized. ....	84.9	12.1	71.6	4.9	2.4	16.3	2.1	61.9	2.2	(28)
(29)	—grain, hull-less or bald. ....	87.1	11.8	81.4	5.9	1.9	12.9	1.3	68.9	2.1	(29)
(30)	—grain, winter. ....	87.5	7.5	70.9	8.4	2.5	9.3	5.0	68.9	1.8	(30)
(31)	—feed. ....	88.4	9.8	65.0	5.6	7.5	12.5	8.3	56.8	3.3	(31)
(32)	Barley corn horsebean sweet lupine oat vetch mixed fodder, prebloom, dried. ....	(87.0)	11.0	42.1	2.8	9.7	18.8	28.4	27.8	2.3	(32)
(33)	Barley oat pea vetch mixed fodder, immature, fed green. ....	25.6	1.7	14.3	7.6	2.1	3.1	6.8	13.0	0.6	(33)
(34)	Bean silage. ....	16.2	2.3	9.8	3.4	1.4	2.9	5.1	6.2	0.6	(34)
(35)	Bean steamed potato mixed silage. ....	22.8	1.6	18.9	10.7	1.2	2.3	1.8	17.2	0.3	(35)

## AND DIGESTIBILITY WITH SWINE

AND DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS															Row No.
Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
(1)	37	47	22	49	14	14	9.0	34.6	9.9	19.1	32.5	36.4	2.1	(1)	
(2)	56	61	32	71	50	2	14.5	50.0	11.7	23.8	29.6	32.0	2.9	(2)	
(3)	66	71	43	76	10	3	15.0	58.2	10.2	21.1	21.2	43.7	3.8	(3)	
(4)	36	46	22	47	11	13	8.6	33.6	9.8	18.8	32.7	36.6	2.1	(4)	
(5)	82	77	11	89	44	139	9.6	80.9	3.0	12.4	5.3	77.1	2.2	(5)	
(6)	81	71	3	89	51	26	8.7	80.3	2.8	12.2	5.4	77.2	2.4	(6)	
(7)	83	75	9	89	46	43	9.5	81.6	3.0	12.7	4.1	78.0	2.2	(7)	
(8)	83	75	-21	90	67	4	9.4	82.8	2.8	12.6	4.3	77.1	3.2	(8)	
(9)	83	78	14	90	44	68	9.5	81.8	3.0	12.2	5.6	77.2	2.0	(9)	
(10)	80	70	7	88	49	16	8.4	79.3	3.0	12.0	5.5	77.2	2.3	(10)	
(11)	78	74	19	86	45	10	10.1	76.7	3.2	13.6	7.9	72.6	2.7	(11)	
(12)	85	75	20	93	33	2	9.6	83.8	1.7	12.8	6.9	76.9	1.7	(12)	
(13)	80	74	14	88	44	36	9.9	79.3	3.3	13.4	5.7	75.3	2.3	(13)	
(14)	81	69	7	88	50	16	8.1	79.2	2.9	11.8	5.6	77.5	2.2	(14)	
(15)	83	78	12	89	38	45	10.0	81.1	2.7	12.3	5.2	77.4	1.9	(15)	
(16)	82	77	-9	89	55	6	10.0	81.0	2.8	13.0	5.0	76.4	2.8	(16)	
(17)	84	80	4	90	64	14	9.5	83.2	2.9	11.9	5.1	77.6	2.5	(17)	
(18)	84	77	18	91	54	11	9.6	83.5	3.0	12.4	5.1	77.3	2.2	(18)	
(19)	84	77	15	90	50	31	8.1	82.6	3.1	10.5	5.0	79.3	2.1	(19)	
(20)	84	80	6	90	49	26	9.8	82.2	3.3	12.3	4.9	77.2	2.3	(20)	
(21)	83	80	12	90	36	7	8.8	81.5	3.2	11.0	5.5	78.0	2.3	(21)	
(22)	82	78	15	89	38	46	10.6	80.7	2.8	13.6	5.7	75.8	2.1	(22)	
(23)	80	67	-1	88	58	15	8.5	79.2	2.7	12.7	5.4	76.8	2.4	(23)	
(24)	75	76	72	78	74	10	12.4	77.1	3.2	16.3	5.1	72.9	2.5	(24)	
(25)	86	76	42	91	56	4	11.2	84.3	3.2	14.8	4.8	75.0	2.2	(25)	
(26)	78	67	29	87	42	1	7.5	78.0	2.6	11.2	7.9	77.4	0.9	(26)	
(27)	86	72	35	91	35	2	10.4	84.5	2.4	14.4	2.3	78.6	2.3	(27)	
(28)	85	74	31	91	50	2	14.2	84.3	2.8	19.2	2.5	72.9	2.6	(28)	
(29)	95	91	21	98	41	4	13.5	93.5	2.2	14.8	1.5	79.1	2.4	(29)	
(30)	84	81	25	90	1	3	8.6	81.0	2.9	10.6	5.7	78.8	2.0	(30)	
(31)	76	79	21	84	77	5	11.1	73.5	8.5	14.1	9.4	64.3	3.7	(31)	
(32)	53	59	46	59	30	1	12.7	48.4	11.2	21.6	32.6	32.0	2.6	(32)	
(33)	61	53	38	75	24	3	6.5	55.8	8.2	12.2	26.7	50.4	2.5	(33)	
(34)	66	78	46	77	37	1	13.9	60.8	8.8	17.8	31.6	38.1	3.7	(34)	
(35)	88	70	54	95	2	1	7.1	82.9	5.3	10.1	7.8	75.3	1.5	(35)	

TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutri- tive ratio	Ash	Crude protein	Crude fiber	N-free ex- tract	Ether ex- tract	
		%	%	%	1:	%	%	%	%	%	
(1)	Beet crowns and tops, sugar, dehydrated.....	(82.6)	5.5	44.3	7.0	15.8	12.0	15.5	38.3	1.0	(1)
(2)	—tops, sugar, dry.....	89.2	7.0	45.8	5.5	16.4	13.7	17.8	39.9	1.4	(2)
(3)	—tops, sugar, dry.....	88.3	4.9	51.0	9.4	13.6	10.9	14.7	48.0	1.1	(3)
(4)	—tops, sugar, dehydrated.....	86.5	4.2	50.0	11.0	12.0	9.9	10.1	53.3	1.2	(4)
(5)	—sugar, roots.....	27.3	0.5	24.4	48.6	0.9	1.4	1.3	23.6	0.1	(5)
(6)	—silage, sugar, roots.....	25.7	.....	21.0	.....	1.0	1.4	1.6	21.6	0.1	(6)
(7)	—sugar, roots, dried.....	93.6	2.6	83.8	30.7	4.3	4.1	4.4	80.6	0.2	(7)
(8)	—pulp, dried.....	86.6	3.6	64.6	17.1	5.0	8.7	16.5	56.0	0.4	(8)
(9)	—pulp, molasses added, dried.....	89.4	2.1	67.8	30.3	4.7	8.7	15.5	59.5	1.0	(9)
(10)	—pulp, steamed.....	90.2	6.0	75.2	11.4	5.0	9.6	14.2	61.0	0.4	(10)
(11)	Bladekelp, dry.....	86.9	1.4	43.6	30.4	15.6	7.7	6.6	56.6	0.4	(11)
(12)	Blood meal.....	87.3	64.6	61.1	.....	2.9	82.8	0	0.4	1.2	(12)
(13)	Bone meal, low ash.....	92.5	34.6	52.9	0.5	45.7	37.6	.....	1.8	7.4	(13)
(14)	Bone and fish mixed meal.....	78.0	52.9	55.7	0	2.6	68.7	.....	3.5	3.2	(14)
(15)	Brewers' dried grains.....	85.4	25.1	43.0	0.7	3.6	31.8	12.5	30.6	6.9	(15)
(16)	Buckwheat, seed.....	88.5	7.7	68.1	7.8	1.9	10.7	12.7	60.0	3.2	(16)
(17)	—feed, low protein, low fiber.....	87.5	9.4	70.6	6.6	2.2	11.6	11.8	59.9	2.0	(17)
(18)	Buttermilk, dried.....	92.4	29.9	76.9	1.6	9.1	32.2	.....	49.3	1.3	(18)
(19)	Carrots, roots.....	11.9	1.0	9.7	8.4	1.2	1.5	1.1	8.0	0.1	(19)
(20)	Clover, crimson, ryegrass vetch mixed hay, early bloom.....	(87.0)	5.0	53.0	9.7	8.2	12.7	21.6	41.9	2.6	(20)
(21)	Clover, red, potato mixed silage.....	19.2	1.5	13.6	7.8	1.7	2.6	1.8	12.8	0.3	(21)
(22)	Clover seed screenings.....	88.3	21.4	59.2	1.8	10.7	30.6	13.3	23.5	5.2	(22)
(23)	Cockchafers, dried.....	85.3	38.0	51.1	0.3	7.0	55.1	13.1	4.5	5.6	(23)
(24)	Coconut oil meal.....	86.9	16.9	72.7	3.3	5.3	23.2	11.9	39.0	7.5	(24)
(25)	Corn, grain.....	86.6	5.1	57.8	10.2	1.4	9.2	2.3	69.9	3.8	(25)
(26)	—grain.....	86.7	6.8	76.7	10.3	1.5	8.9	2.0	70.7	3.6	(26)
(27)	—grain, under 4% fat.....	86.7	7.4	79.5	9.8	1.3	9.2	2.2	70.4	3.6	(27)
(28)	—grain, under 4% fat.....	86.4	6.2	75.3	11.2	1.3	8.5	2.0	71.7	2.9	(28)
(29)	—grain, 4% fat.....	86.7	7.7	79.5	9.3	1.4	9.6	2.3	69.2	4.2	(29)
(30)	—grain, 4% fat.....	87.2	7.6	78.9	9.4	1.7	9.6	2.0	69.5	4.4	(30)
(31)	—grain, under 14% moisture.....	87.6	7.5	80.4	9.7	1.3	9.4	2.3	70.7	3.9	(31)
(32)	—grain, 14-15.5% moisture.....	85.1	8.3	79.5	8.5	1.2	10.3	1.8	67.5	4.3	(32)
(33)	—grain, 15.5-17.5% moisture.....	83.9	6.9	75.5	10.0	1.3	9.1	2.0	68.0	3.5	(33)
(34)	—grain, 17.5-20% moisture.....	81.0	6.2	18.8	2.1	1.4	8.0	1.8	65.6	4.2	(34)
(35)	—grain, under 9% protein.....	87.2	6.8	79.6	10.7	1.3	8.7	2.4	71.2	3.6	(35)
(36)	—grain, under 9% protein.....	86.4	6.2	75.3	11.2	1.3	8.5	2.0	71.7	2.9	(36)
(37)	—grain, 9% protein.....	86.3	7.8	79.2	9.2	1.4	9.7	2.2	69.0	4.0	(37)
(38)	—grain, 9% protein.....	87.2	7.6	78.9	9.4	1.7	9.6	2.0	69.5	4.4	(38)
(39)	—grain, cooked.....	87.0	8.1	79.1	8.8	1.8	9.4	1.6	69.7	4.5	(39)
(40)	—grain, degermed.....	85.4	7.4	79.4	9.7	0.8	9.7	1.1	71.1	2.7	(40)
(41)	—grain, degermed, cooked.....	93.6	9.3	92.7	9.0	0.9	9.8	1.3	80.0	1.6	(41)
(42)	—flakes.....	88.8	9.9	84.7	7.6	0.9	10.4	0.6	74.9	2.0	(42)
(43)	Corn and cob meal.....	86.7	6.2	70.1	10.5	1.8	8.5	6.9	65.6	3.9	(43)

## AND DIGESTIBILITY WITH SWINE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	67	46	45	83	0	1	6.7	53.6	19.1	14.5	18.8	46.4	1.2	( 1 )	
( 2 )	63	51	39	82	-26	2	7.8	51.3	18.4	15.4	20.0	44.6	1.6	( 2 )	
( 3 )	67	45	51	81	-12	3	5.6	57.8	15.4	12.4	16.6	54.4	1.2	( 3 )	
( 4 )	65	42	53	76	0	7	4.8	57.8	13.9	11.5	11.7	61.5	1.4	( 4 )	
( 5 )	93	36	88	97	-46	5	1.8	89.3	3.3	5.0	4.8	86.4	0.5	( 5 )	
( 6 )	85	0	58	93	0	1	...	81.9	4.0	5.3	6.2	84.2	0.3	( 6 )	
( 7 )	96	64	66	97	9	5	2.8	89.5	4.6	4.4	4.7	86.1	0.2	( 7 )	
( 8 )	82	41	83	89	-234	6	4.1	74.6	5.8	10.1	19.1	64.5	0.5	( 8 )	
( 9 )	80	25	84	89	-18	2	2.4	75.8	5.3	9.7	17.3	66.6	1.1	( 9 )	
(10)	88	63	91	92	26	3	6.7	83.4	5.6	10.7	15.7	67.6	0.4	(10)	
(11)	61	18	41	69	53	5	1.6	50.2	17.9	8.9	7.6	65.1	0.5	(11)	
(12)	78	78	0	-104	-116	6	74.0	70.0	3.3	94.9	0	0.4	1.4	(12)	
(13)	71	92	..	..	110	1	37.4	57.2	49.4	40.7	.....	1.9	8.0	(13)	
(14)	76	77	..	..	39	1	67.8	71.4	3.3	88.1	.....	4.5	4.1	(14)	
(15)	46	79	2	27	60	2	29.4	50.3	4.2	37.2	14.6	35.9	8.1	(15)	
(16)	78	72	60	85	24	2	8.7	76.9	2.1	12.1	14.4	67.8	3.6	(16)	
(17)	79	81	28	90	89	1	10.7	80.7	2.5	13.2	13.5	68.5	2.3	(17)	
(18)	94	93	..	98	-30	2	32.4	83.2	9.9	34.8	.....	53.3	2.0	(18)	
(19)	91	71	85	94	68	2	8.7	81.7	9.9	12.2	9.0	67.8	1.1	(19)	
(20)	65	39	55	79	51	2	5.7	60.9	9.4	14.6	24.8	48.2	3.0	(20)	
(21)	78	60	44	88	0	1	8.0	71.0	8.9	13.4	9.5	66.8	1.4	(21)	
(22)	72	70	66	83	45	1	24.2	67.0	12.1	34.6	15.1	32.3	5.9	(22)	
(23)	57	69	-2	44	90	7	44.6	59.9	3.2	64.6	15.4	5.2	6.6	(23)	
(24)	80	73	60	39	83	2	19.5	83.7	6.1	26.7	13.7	44.9	8.6	(24)	
(25)	88	56	21	69	46	63	5.9	66.8	1.6	10.6	2.6	80.8	4.4	(25)	
(26)	86	76	3	90	78	14	7.8	88.5	1.7	10.3	2.3	81.6	4.1	(26)	
(27)	89	80	40	93	72	36	8.5	91.7	1.5	10.6	2.5	81.3	4.1	(27)	
(28)	85	73	-21	89	86	8	7.2	87.1	1.5	9.8	2.3	83.0	3.4	(28)	
(29)	89	80	48	93	67	27	8.9	91.7	1.6	11.1	2.6	79.8	4.9	(29)	
(30)	88	79	36	92	67	6	8.7	90.5	1.9	11.0	2.3	79.7	5.1	(30)	
(31)	90	80	47	93	70	46	8.6	91.8	1.5	10.7	2.6	80.8	4.4	(31)	
(32)	90	81	41	94	72	3	9.8	93.4	1.4	12.1	2.1	79.4	5.0	(32)	
(33)	88	76	35	92	67	10	8.2	90.0	1.5	10.8	2.4	81.1	4.2	(33)	
(34)	87	77	34	92	64	2	7.6	23.3	1.7	9.9	2.2	81.0	5.2	(34)	
(35)	89	78	50	93	67	20	7.8	91.3	1.5	10.0	2.7	81.7	4.1	(35)	
(36)	85	73	-21	89	86	8	7.2	87.1	1.5	9.8	2.3	83.0	3.4	(36)	
(37)	89	80	41	93	71	43	9.0	91.8	1.6	11.2	2.5	80.1	4.6	(37)	
(38)	88	79	36	92	67	6	8.7	90.5	1.9	11.0	2.3	79.7	5.1	(38)	
(39)	89	86	23	92	64	2	9.3	90.9	2.1	10.8	1.8	80.1	5.2	(39)	
(40)	92	76	34	95	68	4	8.7	93.0	0.9	11.4	1.3	83.2	3.2	(40)	
(41)	98	94	94	99	85	2	9.9	99.0	1.0	10.5	1.4	85.4	1.7	(41)	
(42)	95	95	30	97	45	2	11.1	95.4	1.0	11.7	0.7	84.4	2.2	(42)	
(43)	79	72	28	86	65	2	7.1	80.9	2.1	9.8	8.0	75.6	4.5	(43)	

TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
( 1 )	Corn ear chops, milk stage, fed green.....	27.5	2.1	20.8	8.9	0.7	3.1	3.4	19.2	1.1	( 1 )
( 2 )	Cottonseed, whole, high fiber (92.0)	9.6	39.5	3.1	4.6	19.9	24.1	29.7	14.7	( 2 )	
( 3 )	—feed.....	90.8	27.5	60.9	1.2	5.6	35.8	15.3	27.8	6.3	( 3 )
( 4 )	—meal, all expts.....	93.6	36.3	72.9	1.0	5.9	42.2	11.2	27.2	7.1	( 4 )
( 5 )	—meal, 40% protein, high fiber.....	92.6	33.5	70.3	1.1	6.7	40.8	11.2	27.1	6.8	( 5 )
( 6 )	—meal, 41% protein, high fiber.....	95.1	36.3	72.5	1.0	5.6	42.8	11.7	27.6	7.4	( 6 )
( 7 )	—meal, 43% protein, high fiber.....	93.4	38.9	75.4	0.9	5.3	43.2	10.9	26.9	7.1	( 7 )
( 8 )	Cowpeas, seed.....	(88.8)	24.2	74.7	2.1	3.8	25.8	6.7	50.7	1.8	( 8 )
( 9 )	Distillers' dried solubles.....	38.7	9.7	64.8	5.7	8.6	16.0	6.2	57.7	0.2	( 9 )
(10)	Fish meal, all expts.....	86.5	55.5	62.2	0.1	22.2	60.4	.....	.....	3.6	(10)
(11)	—low ash.....	89.2	66.2	78.0	0.2	14.1	71.2	.....	.....	5.8	(11)
(12)	—medium ash.....	84.1	53.6	65.3	0.2	20.6	56.4	.....	.....	5.0	(12)
(13)	—high ash.....	86.1	47.9	49.2	0	31.9	52.6	.....	.....	1.5	(13)
(14)	—50% protein.....	84.4	49.2	55.6	0.1	24.9	53.5	.....	.....	4.3	(14)
(15)	—Norwegian cod, 50% protein, air-dried.....	86.1	49.2	53.0	0.1	29.8	54.0	.....	.....	2.0	(15)
(16)	—cod, 60% protein, steam-dried.....	85.5	61.0	65.7	0.1	20.7	62.9	.....	.....	1.2	(16)
(17)	—herring, 65% protein, oily.....	90.8	64.6	87.2	0.4	12.9	68.6	.....	.....	10.7	(17)
(18)	—herring, 70% protein, low fat.....	87.6	68.5	70.8	0	15.2	73.7	.....	.....	1.1	(18)
(19)	Fish press water, condensed.....	63.2	39.9	50.4	0.3	15.8	41.6	.....	.....	4.7	(19)
(20)	Garbage, dried.....	91.5	19.1	57.3	2.0	17.7	31.3	7.2	24.3	11.0	(20)
(21)	—military camp.....	30.4	5.6	37.5	5.7	1.8	6.2	0.5	13.2	8.7	(21)
(22)	—urban, summer.....	32.2	2.9	28.5	8.8	3.2	4.7	1.8	18.7	3.8	(22)
(23)	Gluten.....	89.4	79.9	90.2	0.1	0.7	83.2	0.3	0.7	4.5	(23)
(24)	Grass, mixed pasture, British Isles.....	28.5	4.6	14.4	2.1	4.2	6.9	4.4	12.0	1.0	(24)
(25)	—mixed pasture, prebloom, fed green, British, Isles.....	25.1	2.2	13.2	4.9	2.9	4.0	4.7	12.7	0.8	(25)
(26)	—mixed, prebloom, fed green, Europe.....	18.0	1.7	8.5	4.0	2.5	3.3	4.3	7.1	0.8	(26)
(27)	Hay meal, meadow, Europe.....	94.2	4.7	35.6	6.6	7.6	12.7	34.1	37.6	2.2	(27)
(28)	Hemp screenings.....	87.0	-2.1	6.8	.....	16.1	18.6	20.8	27.2	4.3	(28)
(29)	Horsebean vetch mixed hay, early bloom.....	(87.0)	13.3	40.5	2.0	14.2	19.9	24.5	25.6	2.8	(29)
(30)	Ivory nut residue meal.....	87.8	0.5	66.7	.....	1.4	4.7	47.1	33.3	1.3	(30)
(31)	Linseed capsule chaff.....	88.0	4.1	33.9	7.1	12.5	9.7	28.9	29.2	7.7	(31)
(32)	—capsule chaff, molasses added, dry.....	80.1	4.2	42.2	9.0	9.5	9.6	14.8	43.2	3.0	(32)
(33)	—oil meal, o.d. process.....	90.7	32.3	68.4	1.1	5.9	35.9	11.3	31.3	6.3	(33)
(34)	Lupine hay, sweet yellow, early, bloom, dehydrated.....	89.8	9.5	47.0	3.9	9.9	19.5	27.1	30.4	2.9	(34)
(35)	—fodder, sweet, fed green.....	13.2	1.4	7.9	4.6	0.9	2.1	4.5	5.4	0.3	(35)
(36)	—fodder, sweet, full bloom, fed green.....	12.3	1.2	7.3	5.0	0.9	1.9	3.9	5.3	0.3	(36)



## AND DIGESTIBILITY WITH SWINE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ethe ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							%	%	%	%	%	%	%		
( 1 )	74	67	46	82	55	1	7.6	75.5	2.6	11.4	12.2	69.7	4.1	( 1 )	
( 2 )	35	48	36	25	42	2	10.3	42.5	4.9	21.4	25.9	32.0	15.8	( 2 )	
( 3 )	63	77	39	56	84	2	30.3	67.1	6.2	39.4	16.9	30.6	6.9	( 3 )	
( 4 )	74	86	31	69	90	6	38.8	77.9	6.3	45.1	12.0	29.0	7.6	( 4 )	
( 5 )	74	82	40	71	86	2	36.2	75.9	7.2	44.1	12.1	29.3	7.3	( 5 )	
( 6 )	71	85	29	63	92	2	38.2	76.2	5.9	45.0	12.3	29.0	7.8	( 6 )	
( 7 )	76	90	24	72	91	2	41.6	80.7	5.7	46.2	11.7	28.8	7.6	( 7 )	
( 8 )	86	94	49	90	38	2	27.3	84.1	4.3	29.0	7.6	57.1	2.0	( 8 )	
( 9 )	83	60	68	93	-690	2	10.9	73.0	9.7	18.1	7.0	65.0	0.2	( 9 )	
(10)	85	92	..	..	81	6	64.2	71.9	25.6	69.8	.....	.....	4.2	(10)	
(11)	89	93	..	..	91	2	74.2	87.5	15.8	79.8	.....	.....	6.5	(11)	
(12)	55	95	..	..	105	4	63.7	77.7	24.5	67.1	.....	.....	5.9	(12)	
(13)	86	91	..	..	42	2	55.6	57.2	37.0	61.1	.....	.....	1.7	(13)	
(14)	90	92	..	..	66	5	58.3	65.9	29.5	63.4	.....	.....	5.1	(14)	
(15)	86	91	..	..	85	1	57.1	61.5	34.6	62.7	.....	.....	2.3	(15)	
(16)	88	97	..	..	176	1	71.4	76.9	24.2	73.6	.....	.....	1.4	(16)	
(17)	95	94	..	..	94	1	71.1	96.0	14.2	75.6	.....	.....	11.8	(17)	
(18)	83	93	..	..	89	1	78.2	80.9	17.4	84.1	.....	.....	1.3	(18)	
(19)	102	96	..	..	99	2	63.2	79.7	25.0	65.8	.....	.....	7.4	(19)	
(20)	85	61	47	65	77	2	20.9	62.6	19.3	34.2	7.9	26.6	12.0	(20)	
(21)	95	90	69	99	95	2	18.4	123.4	6.0	20.4	1.6	43.5	28.5	(21)	
(22)	85	61	57	96	77	2	9.0	88.4	9.8	14.7	5.7	58.0	11.8	(22)	
(23)	92	96	-190	-46	111	1	89.4	100.9	0.8	93.1	0.3	0.8	5.0	(23)	
(24)	62	67	57	72	-58	2	16.3	50.6	14.7	24.3	15.6	41.8	3.6	(24)	
(25)	60	55	55	69	-24	2	8.9	52.5	11.4	16.1	18.7	50.7	3.1	(25)	
(26)	52	52	39	52	84	2	9.6	47.4	13.9	18.4	23.9	39.6	4.2	(26)	
(27)	42	37	44	47	-36	2	5.0	37.8	8.1	13.5	36.2	39.9	2.3	(27)	
(28)	11	-11	7	25	6	2	-2.4	7.8	13.5	21.4	23.9	31.3	4.9	(28)	
(29)	52	67	31	60	68	2	15.3	46.6	16.3	22.9	28.2	29.4	3.2	(29)	
(30)	78	-12	84	83	6	1	-0.6	76.0	1.6	5.4	53.7	37.8	1.5	(30)	
(31)	35	43	19	36	79	2	4.7	38.5	14.2	11.0	32.8	33.2	8.8	(31)	
(32)	58	44	20	74	46	2	5.3	52.7	11.9	12.0	18.5	53.8	3.8	(32)	
(33)	75	90	20	80	62	5	35.6	75.4	6.5	39.6	12.5	34.4	7.0	(33)	
(34)	57	49	45	76	32	2	10.6	52.3	11.0	21.7	30.2	33.9	3.2	(34)	
(35)	64	68	58	71	4	4	10.6	59.9	6.6	15.6	34.4	41.0	2.4	(35)	
(36)	64	65	54	75	2	1	9.9	59.4	7.4	15.3	31.6	43.1	2.6	(36)	

TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Lupine fodder, sweet, post-bloom, fed green . . .	14.2	1.6	8.5	4.4	0.8	2.3	5.3	5.5	0.3	(1)
(2)	—silage, sweet yellow, full bloom . . . . .	13.4	2.1	6.3	2.0	2.2	3.1	4.4	3.3	0.4	(2)
(3)	—seed, all expts . . . . .	90.1	34.3	69.6	1.0	4.2	39.5	13.4	28.3	4.7	(3)
(4)	—seed, sweet green . . . . .	90.0	35.1	74.9	1.1	4.3	38.2	16.4	27.2	3.9	(4)
(5)	—seed, sweet green . . . . .	90.0	33.9	72.1	1.1	4.3	38.2	16.4	27.2	3.9	(5)
(6)	—seed, sweet blue, low fiber	87.3	28.4	70.1	1.5	3.3	33.9	7.2	37.1	5.8	(6)
(7)	—seed, sweet blue, poor quality . . . . .	86.6	29.9	72.3	1.4	3.4	30.5	15.3	33.3	4.1	(7)
(8)	—seed, sweet yellow . . . . .	91.1	36.1	69.6	0.9	4.5	41.9	13.8	26.3	4.6	(8)
(9)	Mallow, fed green . . . . .	11.2	2.2	5.6	1.6	1.6	2.9	2.9	3.4	0.4	(9)
(10)	Mangels, roots . . . . .	11.5	1.2	9.5	6.9	0.9	1.5	0.8	8.2	0.1	(10)
(11)	—roots . . . . .	30.4	1.8	23.0	11.8	2.7	3.2	2.2	22.2	0.1	(11)
(12)	—silage, roots . . . . .	10.4	1.0	8.4	7.7	1.0	1.3	0.7	7.3	0.1	(12)
(13)	Meat and bone scrap . . . . .	90.7	48.5	79.2	0.6	19.0	54.5	0.3	2.8	14.1	(13)
(14)	Milk, cow's . . . . .	12.3	3.5	15.3	3.4	0.8	3.6	.....	4.5	3.4	(14)
(15)	—skimmed, centrifugal . . .	9.6	2.7	9.4	2.5	0.6	2.7	.....	6.2	0.1	(15)
(16)	—skimmed, dried . . . . .	94.8	33.2	85.5	1.6	8.4	33.8	.....	51.8	0.8	(16)
(17)	—skimmed, fat added and emulsified . . . . .	12.2	2.6	17.5	5.8	0.7	2.7	.....	3.4	5.4	(17)
(18)	—skimmed, reinforced . . .	15.3	2.7	14.6	4.3	0.7	2.9	.....	11.4	0.3	(18)
(19)	Molasses yeast mixture . . .	50.6	9.0	40.1	3.4	5.9	12.7	.....	32.0	.....	(19)
(20)	Oat hulls . . . . .	92.0	2.6	27.0	9.6	7.2	4.5	26.9	50.1	3.3	(20)
(21)	—mill feed . . . . .	91.8	3.5	23.1	5.6	6.2	6.0	26.6	51.1	1.9	(21)
(22)	—grain, all expts . . . . .	89.9	11.2	65.4	4.8	2.7	13.4	8.1	61.6	4.1	(22)
(23)	—grain, all expts . . . . .	91.3	8.6	61.7	6.2	3.7	11.0	13.1	59.0	4.5	(23)
(24)	—grain, low fat . . . . .	89.1	11.6	64.6	4.6	2.7	13.6	7.0	62.3	3.5	(24)
(25)	—grain, high fat . . . . .	93.1	9.7	71.2	6.4	3.2	12.4	12.4	58.1	7.0	(25)
(26)	—grain, under 12% fiber . .	89.6	9.0	62.4	6.0	3.3	11.5	11.1	58.9	4.8	(26)
(27)	—grain, 8-10% protein . . .	88.0	6.8	52.2	6.7	3.3	9.9	11.2	53.8	4.8	(27)
(28)	—grain, 11% protein . . . .	90.2	9.9	66.4	5.7	3.3	12.1	11.1	53.8	4.9	(28)
(29)	—grain, light weight . . . .	88.0	4.3	20.1	3.7	5.1	6.5	25.4	50.0	1.0	(29)
(30)	—shorts . . . . .	91.0	9.5	56.9	5.0	5.1	13.1	13.1	53.7	6.0	(30)
(31)	Palm kernel oil meal, doum-palm, high fiber, low protein . . . . .	88.4	-0.5	73.4	.....	1.6	4.7	36.4	38.4	7.3	(31)
(32)	Pear pomace . . . . .	88.2	.....	35.5	.....	1.4	3.7	28.8	52.4	1.9	(32)
(33)	Pearlmillet, grain . . . . .	89.2	7.7	56.6	6.4	1.7	12.6	2.8	68.1	4.0	(33)
(34)	Peas, seed . . . . .	85.6	18.7	75.2	3.0	2.9	21.8	7.4	51.9	1.6	(34)
(35)	—seed . . . . .	89.8	19.6	74.2	2.8	2.8	22.0	8.4	56.5	0.1	(35)
(36)	—seed, cooked . . . . .	82.5	19.1	71.4	2.8	2.7	21.9	6.3	50.1	1.5	(36)
(37)	Pea bran . . . . .	85.9	20.3	78.1	2.9	2.7	22.2	7.2	52.8	1.0	(37)
(38)	Peanut oil . . . . .	99.9	.....	220.1	.....	0.1	.....	.....	.....	99.8	(38)
(39)	—oil meal . . . . .	88.5	43.6	82.1	0.9	5.3	46.4	5.3	23.5	8.0	(39)
(40)	Pigeonpeas, seed . . . . .	87.5	18.5	73.2	3.0	3.7	20.0	7.3	54.0	2.5	(40)
(41)	Pork cracklings, ground . . .	93.7	56.1	124.0	1.2	2.2	59.1	.....	.....	30.7	(41)
(42)	Potato tubers . . . . .	23.8	1.0	20.5	19.8	1.2	1.9	0.6	20.0	0.1	(42)
(43)	—tubers . . . . .	23.2	0.3	19.3	63.6	1.2	2.0	0.7	19.2	0.1	(43)
(44)	—cooked . . . . .	22.5	1.6	19.6	11.5	1.2	2.2	0.7	18.3	0.1	(44)
(45)	—cooked . . . . .	23.7	1.2	20.8	16.7	1.6	1.9	0.8	19.3	0.1	(45)
(46)	—peelings . . . . .	(24.8)	1.8	21.5	10.8	1.5	2.5	0.8	19.9	0.1	(46)



## AND DIGESTIBILITY WITH SWINE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude	Total	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract		
							protein	dig. nutri- ents							
							%	%		%	%	%	%		
( 1 )	63	70	61	66	7	1	11.1	59.8	5.9	15.9	37.1	38.9	2.2	( 1 )	
( 2 )	53	68	35	54	81	2	15.5	46.8	16.4	22.8	32.6	24.6	3.6	( 2 )	
( 3 )	78	87	40	87	50	19	38.1	77.2	4.7	43.8	14.9	31.4	5.2	( 3 )	
( 4 )	84	92	62	86	71	1	39.0	83.2	4.8	42.4	18.2	30.3	4.3	( 4 )	
( 5 )	82	89	62	86	52	1	37.7	80.1	4.8	42.4	18.2	30.3	4.3	( 5 )	
( 6 )	78	84	..	91	60	2	32.6	80.3	3.8	38.8	8.2	42.5	6.7	( 6 )	
( 7 )	82	98	55	90	44	2	34.5	83.5	3.9	35.2	17.7	38.5	4.7	( 7 )	
( 8 )	77	86	42	86	50	13	39.6	76.4	4.9	46.0	15.2	28.8	5.1	( 8 )	
( 9 )	58	75	33	65	29	2	19.5	50.3	14.0	26.0	25.7	30.8	3.5	( 9 )	
(10)	91	78	82	96	-86	2	10.4	82.6	8.0	13.4	6.7	71.1	0.8	(10)	
(11)	85	55	46	92	-49	8	5.9	75.6	9.0	10.7	7.2	72.7	0.4	(11)	
(12)	90	75	77	96	-68	2	9.3	80.9	9.4	12.4	6.4	70.9	0.9	(12)	
(13)	82	89	..	-46	100	13	53.5	87.2	20.9	60.1	0.3	3.1	15.6	(13)	
(14)	97	97	..	97	96	4	28.5	124.2	6.2	29.4	.....	36.5	27.9	(14)	
(15)	102	98	..	102	151	6	27.9	98.2	6.1	28.5	.....	63.9	1.5	(15)	
(16)	100	98	..	97	122	2	35.0	90.2	8.9	35.7	.....	54.6	0.8	(16)	
(17)	97	97	..	98	96	12	21.2	143.7	6.1	21.8	.....	28.1	44.0	(17)	
(18)	98	95	..	99	87	13	17.9	95.1	4.8	18.8	.....	74.7	1.7	(18)	
(19)	89	71	..	97	..	2	17.8	79.2	11.6	25.1	.....	63.3	.....	(19)	
(20)	28	57	2	37	73	4	2.8	29.4	7.8	4.9	29.2	54.5	3.6	(20)	
(21)	25	59	8	28	73	4	3.8	25.2	6.8	6.5	29.0	55.6	2.1	(21)	
(22)	71	84	-17	78	82	10	12.5	72.8	3.1	14.9	9.0	68.4	4.6	(22)	
(23)	67	78	14	74	76	8	9.4	67.6	4.0	12.1	14.4	64.6	4.9	(23)	
(24)	71	85	-27	78	81	8	13.0	72.5	3.0	15.3	7.9	69.9	3.9	(24)	
(25)	71	78	22	78	86	2	10.4	76.6	3.4	13.3	13.3	62.5	7.5	(25)	
(26)	67	78	14	74	76	7	10.0	69.6	3.7	12.8	12.4	65.7	5.4	(26)	
(27)	57	69	-4	66	64	2	7.7	59.3	3.7	11.2	12.7	66.9	5.5	(27)	
(28)	71	82	21	77	81	5	11.0	73.6	3.7	13.4	12.3	65.2	5.4	(28)	
(29)	24	66	6	27	35	1	4.9	22.8	5.8	7.4	28.9	56.8	1.1	(29)	
(30)	58	72	1	66	88	2	10.4	62.5	5.6	14.4	14.4	59.0	6.6	(30)	
(31)	75	-11	86	73	88	1	-0.6	83.0	1.8	5.3	41.2	43.4	8.3	(31)	
(32)	40	0	14	56	48	9	0	40.2	1.6	4.2	32.7	59.3	2.2	(32)	
(33)	61	61	35	62	64	2	8.6	63.5	1.9	14.1	3.1	76.4	4.5	(33)	
(34)	89	86	67	95	61	3	21.9	87.9	3.4	25.5	8.6	60.6	1.9	(34)	
(35)	85	89	54	90	2	2	21.8	82.6	3.1	24.5	9.4	61.9	1.1	(35)	
(36)	89	87	55	95	36	1	23.1	86.5	3.3	26.5	7.6	60.8	1.8	(36)	
(37)	93	91	72	98	42	1	23.6	90.9	3.1	25.9	8.4	61.4	1.2	(37)	
(38)	99	..	..	..	98	6	.....	220.3	0.1	.....	.....	99.9	.....	(38)	
(39)	88	94	70	84	84	2	49.3	92.8	6.0	52.4	6.0	26.6	9.0	(39)	
(40)	86	92	86	86	36	1	21.1	83.6	4.2	22.9	8.3	61.7	2.9	(40)	
(41)	96	95	..	..	98	24	59.9	132.3	2.4	63.1	.....	32.8	.....	(41)	
(42)	91	51	79	95	0	1	4.1	86.1	5.0	8.1	2.6	84.1	0.3	(42)	
(43)	88	15	79	96	0	2	1.3	83.4	5.1	8.6	3.2	82.9	0.2	(43)	
(44)	93	70	59	97	-85	7	7.0	87.2	5.2	10.0	3.0	81.5	0.3	(44)	
(45)	95	61	81	98	0	5	4.9	87.6	6.7	8.1	3.2	81.7	0.3	(45)	
(46)	92	74	67	96	..	2	7.3	86.8	5.9	9.9	3.4	80.4	0.4	(46)	

TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Potato silage.....	28.3	1.1	25.0	20.9	1.6	1.5	0.8	24.3	0.1	(1)
(2)	—silage, steamed.....	21.8	1.0	19.2	18.2	1.1	1.6	0.7	18.3	0.1	(2)
(3)	—silage, steamed.....	23.4	1.1	20.9	17.5	1.3	1.8	0.7	19.6	0	(3)
(4)	Potato, steamed, rutabaga mixed silage.....	18.4	0.5	14.9	29.6	1.6	1.4	0.8	14.6	0	(4)
(5)	Potato, steamed, sugar beet silage.....	23.1	0.6	19.5	29.0	1.6	1.8	1.4	18.2	0.1	(5)
(6)	Potato flakes.....	87.1	4.7	81.1	16.2	4.0	5.5	1.0	76.5	0.1	(6)
(7)	—flakes or flour.....	85.5	4.1	75.2	17.5	3.4	7.0	2.3	72.5	0.3	(7)
(8)	Potatoes and mineral yeast, dried.....	92.1	30.3	67.5	1.2	8.7	39.3	6.7	36.6	0.8	(8)
(9)	Potato-protein pulp flakes.....	89.0	25.4	43.4	0.7	6.3	37.4	4.9	39.8	0.6	(9)
(10)	Potato pulp, raw, pressed, dried.....	86.2	0.8	81.9	105.8	1.6	2.8	2.2	79.4	0.2	(10)
(11)	—pulp, raw, pressed, dried from sprouted potatoes	85.7	.....	77.1	0	1.5	3.8	3.2	77.0	0.2	(11)
(12)	Proso grain, high fiber....	87.9	8.0	66.3	7.3	3.7	11.8	16.9	51.5	4.0	(12)
(13)	Pumpkins, entire.....	6.1	0.8	4.9	5.1	0.6	1.1	0.8	2.9	0.7	(13)
(14)	Rape, early bloom, dehydrated	82.5	5.3	46.4	7.7	12.6	12.4	20.0	35.0	2.5	(14)
(15)	Rice, polished, cooked.....	87.0	5.5	86.0	14.7	0.3	6.4	0.1	79.6	0.6	(15)
(16)	—bran.....	90.8	10.0	73.6	6.4	8.5	13.2	10.4	46.3	12.4	(16)
(17)	—bran.....	92.5	8.5	60.1	6.1	13.3	12.7	14.3	39.2	13.0	(17)
(18)	—polishings.....	91.5	11.1	89.0	7.0	7.2	12.7	4.1	54.4	13.1	(18)
(19)	—polishings.....	91.4	10.0	88.9	7.9	5.8	12.6	2.1	59.3	11.6	(19)
(20)	Rockweed, dry.....	88.7	0	37.7	.....	15.4	5.2	9.4	54.5	4.2	(20)
(21)	Rutabagas, roots.....	14.1	0.6	11.7	17.2	0.8	0.8	1.0	11.4	0.1	(21)
(22)	Rye, grain.....	84.4	6.7	75.2	10.3	1.6	8.2	1.8	71.6	1.2	(22)
(23)	—bran.....	91.4	10.9	61.1	4.6	6.4	15.5	9.5	56.6	3.4	(23)
(24)	—feed.....	85.2	10.2	64.8	5.4	5.3	14.1	4.8	58.2	2.8	(24)
(25)	—feed flour low-grade.....	84.7	10.3	79.4	6.7	1.4	12.3	0.1	68.8	2.1	(25)
(26)	—flour middlings.....	84.9	9.3	67.3	6.3	3.1	12.8	3.7	62.6	2.7	(26)
(27)	—germ meal.....	88.5	29.9	81.6	1.7	5.3	34.3	3.1	38.3	7.5	(27)
(28)	Sagopalm pith meal, smooth	86.9	—4.5	61.7	.....	3.4	1.7	4.3	77.2	0.3	(28)
(29)	Skin meal.....	93.0	60.1	85.2	0.4	5.8	69.1	.....	11.0	7.1	(29)
(30)	Sorghum grain, broomcorn, ground.....	84.8	5.8	64.4	10.2	2.5	10.7	4.7	63.6	3.3	(30)
(31)	—grain, broomcorn, ground	85.3	5.1	68.2	12.2	2.6	10.3	2.3	64.7	4.9	(31)
(32)	—grain, kafir.....	86.7	7.5	80.1	9.8	1.7	9.6	2.3	70.8	2.3	(32)
(33)	—grain, milo.....	(90.0)	8.5	77.9	8.2	1.8	11.9	2.1	71.3	2.9	(33)
(34)	Soybeans, seed.....	92.4	33.4	93.2	1.8	5.0	40.7	5.0	23.3	18.4	(34)
(35)	Soybean oil meal, solvent process.....	87.4	41.3	74.7	0.8	5.2	45.4	4.8	31.1	1.0	(35)
(36)	Starch, potato.....	82.5	0	81.3	0	0.2	0.9	.....	81.4	.....	(36)
(37)	Sugar, cane.....	99.8	.....	98.7	.....	0.1	.....	.....	99.7	.....	(37)
(38)	—wood.....	98.1	—2.9	61.6	.....	6.4	0.6	.....	86.1	.....	(38)
(39)	Sugar yeast mixture.....	47.6	4.9	43.8	7.9	1.1	6.8	.....	39.7	.....	(39)
(40)	Tankage.....	91.0	53.8	80.4	0.5	10.1	65.6	1.1	2.3	11.9	(40)
(41)	—low fat.....	92.0	60.5	65.4	0.1	19.2	68.8	.....	1.1	2.9	(41)
(42)	—medium fat.....	90.0	58.9	83.2	0.4	9.2	67.7	1.4	1.4	10.3	(42)
(43)	—high fat.....	92.3	45.0	77.4	0.7	9.7	61.6	0.7	4.9	15.4	(43)
(44)	—55% protein.....	91.7	36.4	67.6	0.9	12.9	58.7	4.4	4.2	11.5	(44)
(45)	—60% protein.....	91.8	53.8	91.1	0.7	9.6	63.2	.....	2.8	16.2	(45)

## AND DIGESTIBILITY WITH SWINE—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row No.
	Organic matter	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract	No. of trials	Dig. Crude pro- tein	Total dig. nutri- ents	Ash	Crude pro- tein	Crude fiber	N-free ex- tract	Ether ex- tract			
( 1 )	88	75	43	97	0	1	4.0	88.5	5.7	5.4	2.9	85.8	0.2	( 1 )		
( 2 )	94	62	73	97	0	12	4.6	88.3	5.2	7.4	3.3	83.8	0.3	( 2 )		
( 3 )	95	62	85	98	0	3	4.8	89.3	5.4	7.8	3.1	83.5	0.2	( 3 )		
( 4 )	89	34	75	95	0	1	2.6	81.0	8.7	7.8	4.1	79.2	0.2	( 4 )		
( 5 )	91	37	81	97	0	1	2.8	84.4	7.0	7.6	6.0	79.1	0.3	( 5 )		
( 6 )	98	86	69	99	-11	1	5.4	93.1	4.6	6.3	1.2	87.8	0.1	( 6 )		
( 7 )	92	58	64	96	-7	23	4.8	87.9	4.0	8.2	2.7	84.8	0.3	( 7 )		
( 8 )	82	77	108	88	-113	2	32.9	73.3	9.5	42.7	7.2	39.7	0.9	( 8 )		
( 9 )	74	68	-178	69	-48	6	28.6	48.8	7.1	42.0	5.5	44.7	0.7	( 9 )		
(10)	94	27	85	98	0	2	0.9	95.0	1.8	3.3	2.6	92.1	0.2	(10)		
(11)	90	0	73	97	0	2	.....	90.0	1.7	4.4	3.7	90.0	0.2	(11)		
(12)	75	68	33	92	59	1	9.1	75.4	4.2	13.4	19.2	58.7	4.5	(12)		
(13)	81	72	68	93	57	1	13.3	80.8	9.3	18.5	13.8	47.6	10.8	(13)		
(14)	65	43	51	78	64	1	6.4	56.3	15.3	15.0	24.2	42.5	3.0	(14)		
(15)	98	86	9	100	70	2	6.3	98.9	0.4	7.3	0.1	91.5	0.7	(15)		
(16)	73	76	20	81	86	2	11.0	81.1	9.4	14.5	11.5	50.9	13.7	(16)		
(17)	60	67	20	65	80	2	9.2	65.0	14.4	13.7	15.5	42.4	14.0	(17)		
(18)	88	87	49	91	90	6	12.1	97.3	7.9	13.9	4.5	59.4	14.3	(18)		
(19)	88	79	39	94	86	2	10.9	97.3	6.4	13.8	2.3	64.8	12.7	(19)		
(20)	31	0	0	55	83	1	0	42.5	17.4	5.9	10.6	61.4	4.7	(20)		
(21)	82	84	41	93	0	1	4.5	82.8	6.0	5.4	7.2	81.0	0.4	(21)		
(22)	91	81	30	94	24	6	7.9	89.1	1.9	9.7	2.1	84.9	1.4	(22)		
(23)	68	70	25	74	73	2	11.9	66.8	7.0	17.0	10.4	61.9	3.7	(23)		
(24)	79	72	44	84	57	2	12.0	76.0	6.2	16.6	5.6	68.3	3.3	(24)		
(25)	93	84	-344	96	71	2	12.2	93.8	1.7	14.5	0.1	81.2	2.5	(25)		
(26)	79	72	26	84	75	2	10.9	79.3	3.6	15.1	4.4	73.7	3.2	(26)		
(27)	88	87	95	98	67	4	33.8	92.2	6.0	38.8	3.5	43.2	8.5	(27)		
(28)	73	-276	-11	86	46	2	-5.2	71.0	3.9	1.9	5.0	88.8	0.4	(28)		
(29)	88	87	..	86	98	1	64.6	91.6	6.2	74.3	.....	11.9	7.6	(29)		
(30)	76	54	23	84	55	8	6.8	75.9	2.9	12.6	5.6	75.0	3.9	(30)		
(31)	73	50	48	80	90	1	6.0	79.9	3.0	12.1	3.3	75.9	5.7	(31)		
(32)	91	77	67	96	62	2	8.6	92.4	2.0	11.1	2.7	81.5	2.7	(32)		
(33)	86	71	66	90	60	4	9.4	86.6	2.0	13.2	2.3	79.3	3.2	(33)		
(34)	84	82	30	102	84	5	36.1	100.9	5.6	44.0	5.4	25.1	19.9	(34)		
(35)	90	91	83	91	58	12	47.3	85.5	6.0	52.0	5.5	35.4	1.1	(35)		
(36)	97	-9	..	100	..	2	0	98.6	0.2	1.1	.....	98.7	.....	(36)		
(37)	98	..	..	99	..	1	.....	98.9	0.1	.....	.....	99.9	.....	(37)		
(38)	67	-521	..	75	..	3	-3.1	66.2	6.9	0.6	.....	92.4	.....	(38)		
(39)	92	72	..	98	..	2	10.3	92.0	2.3	14.3	.....	83.4	.....	(39)		
(40)	82	82	-19	45	96	28	59.1	88.3	11.1	72.1	1.2	2.5	13.1	(40)		
(41)	84	88	..	..	73	2	65.8	71.1	20.9	74.3	.....	1.1	3.2	(41)		
(42)	85	87	-32	48	104	16	65.4	92.4	10.2	75.2	1.5	1.7	11.4	(42)		
(43)	76	73	-3	48	87	10	48.7	83.9	10.5	66.7	0.8	5.3	16.7	(43)		
(44)	68	62	-45	138	106	9	39.7	73.7	14.1	64.0	4.8	4.6	12.5	(44)		
(45)	84	85	-4	1	102	6	58.6	99.2	10.5	68.9	.....	2.9	17.7	(45)		

TABLE 3—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Tankage, 65 % protein.....	92.1	62.3	76.1	0.2	15.9	63.4	.....	0.5	7.3	(1)
(2)	—70 % protein.....	88.9	70.9	94.2	0.3	3.7	73.2	.....	.....	12.0	(2)
(3)	Tapioca flour.....	88.3	1.6	83.8	52.6	2.1	2.3	2.5	31.0	0.4	(3)
(4)	Turnips, roots.....	10.4	0.3	8.3	28.6	0.8	0.8	1.3	7.5	0	(4)
(5)	Whale bone meal.....	97.1	16.6	37.0	1.2	64.7	18.8	.....	3.5	10.1	(5)
(6)	—meal.....	90.0	71.4	91.6	0.3	4.6	75.2	0.1	0.7	9.4	(6)
(7)	—meal, extracted.....	89.7	75.4	78.6	0	3.9	82.9	.....	1.3	1.6	(7)
(8)	—meal, partially extracted.....	86.9	71.7	81.5	0.1	3.2	77.1	.....	1.9	4.7	(8)
(9)	—meat and bone meal.....	94.1	36.5	63.4	0.7	32.4	48.0	.....	2.4	11.3	(9)
(10)	Wheat chaff.....	93.2	-1.3	18.6	.....	22.4	6.4	26.3	36.4	1.7	(10)
(11)	—grain.....	88.4	13.0	81.0	5.2	1.8	14.1	2.5	68.2	1.8	(11)
(12)	—grain.....	86.6	10.6	71.4	5.8	1.9	13.2	2.7	67.1	1.8	(12)
(13)	—grain, high fiber.....	87.0	13.7	80.0	4.8	2.2	14.6	9.4	58.8	2.0	(13)
(14)	—bran.....	89.4	12.2	57.1	3.7	5.9	16.0	9.1	54.1	4.3	(14)
(15)	—flour middlings.....	89.8	14.5	71.8	3.9	4.7	18.1	5.9	55.2	5.9	(15)
(16)	—flour middlings.....	89.3	15.0	72.7	3.8	3.8	18.1	5.2	57.2	5.0	(16)
(17)	—germ oil meal.....	84.8	24.6	77.3	2.1	4.4	27.3	1.9	44.6	6.6	(17)
(18)	—germ oil meal, commercial, German.....	88.4	18.1	81.9	3.5	3.7	19.3	3.8	56.4	5.2	(18)
(19)	—gray shorts.....	90.5	15.6	71.6	3.6	4.3	18.6	6.0	56.7	4.9	(19)
(20)	—red dog.....	87.1	15.9	72.6	3.5	3.1	17.9	2.1	61.2	2.8	(20)
(21)	—screenings.....	86.5	10.2	62.8	5.2	1.8	12.7	5.8	64.1	2.1	(21)
(22)	—standard middlings.....	88.6	14.0	64.0	3.6	4.1	17.7	7.4	54.3	5.1	(22)
(23)	—standard middlings.....	87.9	14.2	67.2	3.8	4.3	17.2	6.9	54.9	4.6	(23)
(24)	Whey-protein.....	86.2	35.9	43.4	0.2	27.0	39.4	.....	15.4	4.4	(24)
(25)	Yeast, boiled, pressed.....	25.6	13.6	19.5	0.4	2.8	16.2	.....	5.0	1.6	(25)
(26)	—dried.....	90.1	44.0	65.4	0.5	7.5	49.9	0.5	30.5	1.7	(26)
(27)	—sulfite waste liquors, dried.....	91.3	34.6	63.1	0.8	9.2	42.2	1.8	36.5	1.6	(27)
(28)	—wet.....	21.9	11.8	16.8	0.4	2.1	13.2	.....	5.9	0.7	(28)
(29)	—wood sugar.....	89.0	41.5	74.0	0.8	7.6	46.6	0.7	32.7	1.4	(29)

## AND DIGESTIBILITY WITH SWINE—(Concluded)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude protein	Crude fiber	N-free extract	Ether extract	No. of trials	Dig. Crude protein	Total dig. nutrients	Ash	Crude protein	Crude fiber	N-free extract	Ether extract		
(1)	90	91	..	..	84	5	67.6	82.6	17.3	74.3	.....	0.5	7.9	(1)	
(2)	92	97	..	..	86	8	79.8	106.0	4.2	82.3	.....	13.5	..	(2)	
(3)	97	68	76	99	23	2	1.8	94.9	2.4	2.6	2.8	91.7	0.5	(3)	
(4)	86	34	78	94	0	7	2.7	79.7	7.6	7.9	12.3	71.7	0.5	(4)	
(5)	68	88	..	..	90	1	17.1	38.1	66.6	19.4	..	3.6	10.4	(5)	
(6)	95	95	275	79	92	4	79.3	101.8	5.1	83.5	0.1	0.9	10.4	(6)	
(7)	88	91	..	49	69	6	84.1	87.6	4.3	92.4	.....	1.5	1.8	(7)	
(8)	92	93	..	65	81	5	82.5	93.8	3.7	88.7	.....	2.2	5.4	(8)	
(9)	68	76	..	..	106	2	38.8	67.4	34.4	51.0	.....	2.6	12.0	(9)	
(10)	23	-21	3	28	238	2	-1.4	20.0	24.0	6.9	28.2	39.1	1.8	(10)	
(11)	92	92	24	94	80	8	14.7	91.6	2.0	16.0	2.8	77.2	2.0	(11)	
(12)	83	80	13	86	68	4	12.2	82.4	2.2	15.2	3.0	77.5	2.1	(12)	
(13)	91	94	76	93	99	2	15.8	92.0	2.5	16.8	10.8	67.6	2.3	(13)	
(14)	65	76	23	69	58	11	13.6	63.9	6.6	17.9	10.2	60.5	4.8	(14)	
(15)	77	80	21	81	85	16	16.2	79.9	5.2	20.2	6.6	61.4	6.6	(15)	
(16)	79	83	20	82	87	18	16.8	81.4	4.3	20.3	5.8	64.0	5.6	(16)	
(17)	87	90	41	88	85	2	29.0	91.1	5.2	32.2	2.2	52.6	7.8	(17)	
(18)	89	94	42	91	93	2	20.5	92.7	4.2	21.8	4.3	63.8	5.9	(18)	
(19)	78	84	26	82	72	4	17.2	79.1	4.8	20.5	6.6	62.7	5.4	(19)	
(20)	88	89	-34	91	26	4	18.3	83.3	3.6	20.6	2.4	70.2	3.2	(20)	
(21)	73	80	2	80	27	1	11.8	72.6	2.1	14.7	6.7	74.1	2.4	(21)	
(22)	71	79	20	74	73	16	15.8	72.2	4.6	20.0	8.4	61.3	5.7	(22)	
(23)	78	82	28	82	60	12	16.1	76.5	4.9	19.6	7.9	62.4	5.2	(23)	
(24)	71	91	..	12	57	2	41.6	50.3	31.3	45.7	.....	17.9	5.1	(24)	
(25)	78	84	..	66	70	2	53.3	76.0	11.0	63.4	.....	19.2	6.4	(25)	
(26)	86	88	3	90	-157	16	48.8	72.6	8.3	55.4	0.5	33.9	1.9	(26)	
(27)	73	82	101	76	-32	4	37.9	69.1	10.1	46.2	2.0	40.0	1.7	(27)	
(28)	80	89	..	78	30	8	53.8	76.8	9.6	60.5	.....	26.6	3.3	(28)	
(29)	91	89	8	97	23	8	46.6	83.1	8.5	52.4	0.8	36.7	1.6	(29)	





TABLE 4—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
(1)	Alfalfa hay, all expts.....	86.0	11.4	45.3	1:3.0	7.6	15.4	26.1	35.2	1.7	(1)
(2)	—hay.....	89.6	10.1	42.8	3.2	6.8	14.7	31.4	35.1	1.6	(2)
(3)	—hay, under 13% protein	85.4	7.9	44.3	4.6	7.3	11.6	24.0	40.5	2.0	(3)
(4)	—hay, 13% protein.....	86.5	10.6	48.1	3.5	6.1	14.4	28.9	34.8	2.3	(4)
(5)	—hay, 15% protein.....	86.1	12.1	45.5	2.7	7.8	16.2	26.9	33.6	1.6	(5)
(6)	—hay, 17% protein.....	85.4	12.9	40.9	2.2	7.6	17.2	20.8	38.5	1.3	(6)
(7)	—hay, 2d cutting, pre-bloom.....	84.6	10.8	45.8	3.2	5.3	14.6	30.6	32.2	1.9	(7)
(8)	—hay, 3d cutting, pre-bloom.....	83.6	12.4	45.3	2.6	5.9	16.6	26.8	32.3	2.0	(8)
(9)	—fed green.....	25.2	3.6	14.1	2.9	2.3	4.6	7.3	10.4	0.6	(9)
(10)	—leaves, stemmy, dry...	88.0	16.9	51.0	2.0	10.0	21.6	13.4	41.2	1.8	(10)
(11)	—stems, dry.....	86.6	9.3	42.5	3.6	5.9	12.7	32.9	33.8	1.3	(11)
(12)	Alfalfa clover mixed hay, late bloom.....	(87.0)	7.6	49.2	5.5	7.3	10.3	33.8	34.3	1.3	(12)
(13)	—mixed fodder, fed green, all expts.....	23.1	2.4	11.5	3.8	2.3	3.4	8.5	8.6	0.3	(13)
(14)	—mixed fodder, fed green	(23.1)	1.5	8.5	4.6	2.6	2.6	8.8	8.7	0.4	(14)
(15)	—mixed fodder, 1st cutting, full bloom, fed green.....	24.2	2.0	12.6	5.2	2.2	2.9	9.4	9.3	0.4	(15)
(16)	—mixed fodder, 3d cutting, prebloom, fed green.....	21.9	3.8	13.4	2.5	2.1	4.6	7.2	7.8	0.2	(16)
(17)	—grass mixed hay.....	83.1	4.6	38.7	7.5	7.1	8.6	31.0	34.5	1.9	(17)
(18)	Alfalfa grass mixed hay.....	86.9	5.7	37.5	5.6	6.4	9.8	23.7	44.7	2.3	(18)
(19)	Alfalfa timothy mixed hay..	88.6	6.5	42.0	5.5	5.7	10.1	30.7	40.3	1.8	(19)
(20)	Barley, grain.....	85.0	8.0	70.7	7.9	2.3	10.5	4.6	65.7	1.9	(20)
(21)	—grain.....	94.2	10.7	76.1	6.1	3.2	12.2	5.3	71.3	2.2	(21)
(22)	—middlings.....	89.8	9.4	55.9	4.9	4.3	13.9	10.0	58.2	3.4	(22)
(23)	Beans, seed.....	85.8	21.6	75.2	2.5	3.2	24.3	6.1	51.0	1.2	(23)
(24)	—seed.....	83.6	23.9	70.3	1.9	3.1	27.8	6.7	44.7	1.3	(24)
(25)	Beets, sugar, roots.....	26.1	0.9	21.8	23.8	0.8	1.3	1.7	22.2	0.1	(25)
(26)	—sugar, roots, dried.....	94.3	2.3	79.3	34.2	2.8	3.6	5.0	82.6	0.3	(26)
(27)	—pulp, dried.....	97.0	7.2	77.2	9.7	7.5	10.5	15.1	62.0	1.0	(27)
(28)	Bentgrass clover timothy mixed hay.....	87.1	4.5	32.4	6.1	6.5	9.9	24.3	44.2	2.2	(28)
(29)	Brewers' dried grains.....	92.3	20.5	48.0	1.3	3.1	26.6	14.4	41.8	6.4	(29)
(30)	Buckwheat, seed.....	79.4	6.2	56.2	8.1	2.2	9.5	6.5	59.0	2.2	(30)
(31)	Carrots, roots.....	10.7	1.3	8.9	5.9	1.4	1.5	0.9	6.7	0.2	(31)
(32)	—roots.....	16.4	1.0	14.4	12.7	1.0	1.2	1.7	12.3	0.2	(32)
(33)	Clover hay, all expts.....	82.9	6.6	40.5	5.1	6.3	11.8	29.5	33.1	2.2	(33)
(34)	—hay, full bloom.....	84.7	7.4	44.6	5.0	5.5	12.4	27.6	36.8	2.4	(34)
(35)	Clover silage, crimson.....	22.2	3.6	13.2	2.7	5.2	4.8	4.1	6.3	1.8	(35)
(36)	Clover hay, red.....	86.1	6.9	39.4	4.7	6.5	12.8	31.9	33.0	1.9	(36)
(37)	Clover grass heavy sedge mixed hay.....	85.6	4.5	30.3	5.7	7.5	11.0	22.5	42.1	2.5	(37)
(38)	—mixed silage.....	(20.8)	0.2	7.3	41.7	1.7	2.4	6.0	9.9	0.8	(38)
(39)	Corn cobs, ground.....	81.3	0.4	25.1	60.9	1.4	2.5	24.6	52.2	0.6	(39)
(40)	Corn stover pith removed, chopped, dry.....	91.5	4.5	46.6	9.4	5.4	6.6	27.3	49.3	2.9	(40)
(41)	Corn, grain.....	85.3	8.9	83.3	8.4	1.2	10.2	2.2	67.6	4.1	(41)

## AND DIGESTIBILITY WITH HORSES

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS									Row
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract			
							%	%						%	%	
( 1 )	58	74	39	68	-6	19	13.2	52.7	8.8	17.9	30.3	41.0	2.0	( 1 )		
( 2 )	52	69	36	61	0	4	11.3	47.8	7.6	16.4	35.0	39.2	1.8	( 2 )		
( 3 )	56	68	36	66	24	3	9.2	51.9	8.6	13.6	28.1	47.4	2.3	( 3 )		
( 4 )	60	74	42	70	18	2	12.3	55.6	7.0	16.6	33.4	40.3	2.7	( 4 )		
( 5 )	59	75	41	68	-12	12	14.1	52.9	9.1	18.8	31.3	38.9	1.9	( 5 )		
( 6 )	53	75	25	62	-37	2	15.1	47.9	8.9	20.1	24.3	45.2	1.5	( 6 )		
( 7 )	58	74	40	70	6	1	12.8	54.1	6.3	17.3	36.2	37.9	2.3	( 7 )		
( 8 )	58	75	38	71	-5	3	14.8	54.2	7.1	19.8	32.0	38.7	2.4	( 8 )		
( 9 )	60	79	35	73	23	4	14.4	55.8	9.3	18.2	29.0	41.3	2.2	( 9 )		
(10)	68	78	52	72	-61	1	19.2	58.0	11.4	24.6	15.2	46.8	2.0	(10)		
(11)	52	73	40	56	38	1	10.7	49.1	6.8	14.7	38.0	39.0	1.5	(11)		
(12)	62	74	49	73	..	2	8.7	56.6	8.4	11.8	38.8	39.5	1.5	(12)		
(13)	54	71	38	68	..	6	10.4	49.7	10.0	14.6	36.6	37.4	1.4	(13)		
(14)	40	58	24	56	..	2	6.6	36.9	11.2	11.3	38.1	37.8	1.6	(14)		
(15)	57	71	44	69	..	2	8.4	52.1	9.2	11.8	39.0	38.5	1.5	(15)		
(16)	66	84	46	80	..	2	17.5	61.0	9.7	20.8	32.8	35.6	1.1	(16)		
(17)	50	53	54	49	13	2	5.5	46.6	8.5	10.3	37.3	41.6	2.3	(17)		
(18)	40	58	30	52	29	6	6.6	43.2	7.4	11.3	27.3	51.4	2.6	(18)		
(19)	50	64	42	56	0	4	7.3	47.4	6.4	11.4	34.6	45.6	2.0	(19)		
(20)	84	76	53	89	42	4	9.4	83.2	2.7	12.3	5.4	77.4	2.2	(20)		
(21)	82	88	39	87	25	3	11.4	80.8	3.4	13.0	5.6	75.7	2.3	(21)		
(22)	57	63	22	70	47	4	10.5	62.3	4.8	15.5	11.2	64.7	3.8	(22)		
(23)	90	89	83	94	21	1	25.2	87.7	3.7	28.3	7.1	59.5	1.4	(23)		
(24)	87	86	69	93	9	4	28.6	84.1	3.7	33.3	8.0	53.4	1.6	(24)		
(25)	88	70	53	90	-1	2	3.4	83.4	3.2	4.8	6.6	85.0	0.4	(25)		
(26)	73	63	32	91	42	2	2.4	84.1	3.0	3.8	5.3	87.6	0.3	(26)		
(27)	85	69	79	91	34	1	7.4	79.6	7.7	10.8	15.6	64.9	1.0	(27)		
(28)	40	46	25	47	20	1	5.2	37.2	7.5	11.4	27.9	50.7	2.5	(28)		
(29)	50	77	18	44	46	4	22.2	52.0	3.4	28.8	15.6	45.3	6.9	(29)		
(30)	69	65	6	80	50	2	7.8	70.8	2.8	12.0	8.2	74.2	2.8	(30)		
(31)	94	89	90	97	56	1	12.1	83.2	13.0	13.6	8.0	63.8	1.6	(31)		
(32)	96	88	67	98	47	3	6.4	87.9	6.4	7.3	10.2	74.6	1.5	(32)		
(33)	52	56	38	64	29	5	8.0	48.8	7.6	14.2	35.6	40.0	2.6	(33)		
(34)	55	60	39	67	31	1	8.8	52.6	6.5	14.7	32.6	43.4	2.8	(34)		
(35)	69	75	43	83	64	6	16.1	59.4	23.4	21.5	18.6	28.3	3.2	(35)		
(36)	49	54	35	61	28	1	8.0	45.8	7.5	14.9	37.0	38.4	2.2	(36)		
(37)	38	41	35	41	12	1	5.3	35.4	8.8	12.9	26.3	49.1	2.9	(37)		
(38)	36	7	35	43	43	1	0.8	35.0	8.3	11.7	29.0	47.0	4.0	(38)		
(39)	32	16	5	45	0	2	0.5	30.9	1.7	3.1	30.2	64.3	0.7	(39)		
(40)	51	68	55	47	60	2	4.9	50.9	5.9	7.2	29.8	53.9	3.2	(40)		
(41)	94	87	65	97	81	2	10.4	97.7	1.4	11.9	2.6	79.3	4.8	(41)		



TABLE 4—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Corn, grain.....	84.6	6.3	71.4	10.2	1.4	9.2	2.0	68.2	3.8	(1)
(2)	—grain, under 9% protein.....	84.9	5.7	68.9	11.1	1.2	8.5	2.4	69.6	3.2	(2)
(3)	—grain, 9% protein.....	84.2	6.7	73.3	9.9	1.5	9.6	1.8	67.2	4.1	(3)
(4)	—bran.....	87.0	3.4	64.9	18.1	1.0	6.5	10.6	67.8	1.1	(4)
(5)	Cottonseed feed.....	92.3	29.7	69.7	1.3	6.6	34.6	18.2	25.8	7.1	(5)
(6)	—meal, 36% protein, high fiber.....	91.2	32.0	64.1	1.0	6.1	37.7	11.7	28.4	7.3	(6)
(7)	Grape marc, fed fresh.....	39.2	1.2	11.6	9.1	2.6	5.3	13.2	16.0	2.1	(7)
(8)	—marc meal, molasses added.....	80.5	1.1	27.5	23.6	7.3	9.3	21.7	35.2	7.0	(8)
(9)	Grass mixed hay.....	85.5	6.8	37.1	4.4	6.2	10.7	28.3	37.9	2.4	(9)
(10)	—mixed hay, under 30% fiber.....	86.3	7.4	37.1	4.0	6.0	11.2	26.8	39.7	2.6	(10)
(11)	—mixed hay, over 30% fiber.....	83.9	5.9	38.4	5.6	6.5	9.6	31.2	34.6	2.0	(11)
(12)	—immature, air dried, Europe.....	82.1	9.9	43.7	3.4	12.6	14.4	18.9	33.6	2.6	(12)
(13)	—mixed, pasture, Europe.....	20.1	2.6	8.7	2.4	2.1	3.9	4.6	8.8	0.7	(13)
(14)	Grass legume mixed hay.....	86.6	5.1	37.5	6.4	4.8	10.6	22.9	46.1	2.2	(14)
(15)	Grass weeds mixed hay.....	85.1	7.0	37.5	4.4	6.4	10.6	27.4	38.1	2.6	(15)
(16)	Hay, meadow, Europe.....	86.5	3.9	41.4	9.5	7.2	7.3	22.3	47.5	2.2	(16)
(17)	—meadow, Europe.....	86.1	8.0	53.2	5.6	6.2	11.0	22.3	43.4	3.2	(17)
(18)	—meadow, postbloom, air dried, Europe.....	84.2	6.2	39.4	5.3	6.7	9.4	29.4	36.4	2.3	(18)
(19)	—meadow, overripe, Europe.....	86.6	4.6	36.6	7.0	6.3	7.4	33.1	37.5	2.3	(19)
(20)	—mountain, Europe.....	83.8	6.2	42.9	5.9	5.9	10.7	17.4	46.2	3.6	(20)
(21)	Horsebeans, seed.....	87.0	19.2	69.8	2.6	3.6	25.3	7.1	49.9	1.1	(21)
(22)	Linseed oil meal, old process.....	89.7	27.6	52.4	0.9	5.2	32.9	7.9	37.6	6.1	(22)
(23)	—oil meal, 31% protein.....	89.8	23.6	44.8	0.9	5.9	31.1	7.7	38.5	6.6	(23)
(24)	—oil meal, 34% protein.....	89.6	32.3	59.9	0.9	4.6	34.8	8.1	36.5	5.6	(24)
(25)	Lupine hay, sweet green, prebloom, dehydrated.....	91.2	14.4	56.2	2.9	8.9	20.6	26.8	32.0	2.9	(25)
(26)	—seed, bitterness extracted, wet.....	30.4	15.2	22.3	0.5	0.6	16.1	6.0	5.9	1.8	(26)
(27)	—sweet yellow, oat mixed fodder, fed green.....	21.3	1.8	13.1	6.2	2.9	2.4	6.4	9.1	0.5	(27)
(28)	Marsh hay.....	87.2	4.4	36.4	7.4	5.1	10.8	21.0	47.9	2.4	(28)
(29)	Milk, mare's (Foals).....	12.3	1.9	11.3	5.1	1.7	2.0	.....	7.0	1.6	(29)
(30)	Oat hulls.....	93.4	3.4	30.1	8.6	6.3	4.7	29.1	51.8	1.5	(30)
(31)	—hulls.....	93.5	2.2	15.7	6.4	6.3	1.9	31.1	53.5	0.7	(31)
(32)	—mill feed.....	90.4	4.1	33.2	7.2	6.1	5.6	26.7	50.1	1.9	(32)
(33)	—mill feed.....	91.8	3.1	40.7	12.0	5.3	5.5	25.3	53.5	2.2	(33)
(34)	—straw.....	90.5	1.5	37.5	23.8	6.7	4.4	39.2	37.8	2.4	(34)
(35)	—straw.....	80.2	2.4	43.7	17.2	6.8	3.0	31.8	36.5	2.1	(35)
(36)	—fodder, milk stage, fed green.....	28.4	1.6	15.7	8.7	2.2	2.2	9.9	13.4	0.7	(36)
(37)	—grain, all expts.....	85.4	8.2	59.1	6.2	3.2	10.3	9.0	58.6	4.3	(37)
(38)	—grain.....	87.1	8.9	59.2	5.7	3.4	11.5	11.1	55.6	5.5	(38)
(39)	—grain, Russian.....	86.0	7.8	64.8	7.3	3.1	10.1	8.1	59.1	4.0	(39)
(40)	—grain, Swedish.....	83.2	6.7	64.6	8.7	3.2	8.1	8.1	57.8	5.1	(40)
(41)	—grain, under 5% fat.....	85.6	8.6	64.6	6.6	3.3	10.8	9.5	58.2	3.8	(41)

## AND DIGESTIBILITY WITH HORSES—(Continued)

Row No.	DIGESTION COEFFICIENTS						DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								Row No.
	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract		
( 1 )	83	69	-31	89	59	10	7.5	84.4	1.7	10.9	2.4	80.5	4.5	( 1 )	
( 2 )	80	67	.	85	56	4	6.7	81.2	1.4	10.0	2.8	82.0	3.8	( 2 )	
( 3 )	85	70	-51	92	61	6	8.0	87.0	1.8	11.4	2.1	79.8	4.9	( 3 )	
( 4 )	74	52	140	67	49	2	3.9	74.6	1.1	7.5	12.2	77.9	1.3	( 4 )	
( 5 )	71	86	44	64	96	2	32.2	75.5	7.1	37.5	19.7	28.0	7.7	( 5 )	
( 6 )	66	85	29	49	90	2	35.1	70.3	6.7	41.3	12.8	31.2	8.0	( 6 )	
( 7 )	28	22	20	34	50	1	3.0	29.7	6.6	13.4	33.8	40.8	5.4	( 7 )	
( 8 )	35	12	20	54	20	2	1.4	34.2	9.1	11.6	27.0	43.6	8.7	( 8 )	
( 9 )	48	64	44	45	14	21	8.0	43.4	7.3	12.5	33.1	44.3	2.8	( 9 )	
(10)	48	66	41	45	15	10	8.6	43.0	7.0	13.0	31.1	45.9	3.0	(10)	
(11)	49	61	52	46	11	5	7.0	45.8	7.8	11.4	37.2	41.2	2.4	(11)	
(12)	62	69	57	66	13	1	12.1	53.2	15.3	17.6	23.0	40.9	3.2	(12)	
(13)	51	66	33	62	-59	10	12.7	43.1	10.3	19.3	23.1	43.9	3.4	(13)	
(14)	45	48	39	51	.	2	5.9	43.3	5.6	12.2	26.5	53.2	2.5	(14)	
(15)	47	66	38	50	18	8	8.2	44.1	7.5	12.4	32.2	44.8	3.1	(15)	
(16)	51	54	44	56	21	86	4.5	47.9	8.3	8.4	25.8	54.9	2.6	(16)	
(17)	67	73	53	72	23	2	9.3	61.8	7.2	12.8	25.9	50.4	3.7	(17)	
(18)	50	66	46	52	14	1	7.4	46.8	8.0	11.2	34.9	43.2	2.7	(18)	
(19)	45	62	40	48	16	1	5.3	42.3	7.3	8.5	38.2	43.3	2.7	(19)	
(20)	55	58	48	62	-4	4	7.4	51.2	7.0	12.8	20.8	55.1	4.3	(20)	
(21)	84	76	69	91	11	4	22.1	80.2	4.1	29.1	8.2	57.3	1.3	(21)	
(22)	59	84	.	53	35	4	30.8	58.4	5.8	36.7	8.8	41.9	6.8	(22)	
(23)	52	76	.	49	16	2	26.3	49.9	6.6	34.6	8.6	42.8	7.4	(23)	
(24)	66	93	0	57	54	2	36.1	66.9	5.1	38.8	9.0	40.9	6.2	(24)	
(25)	67	70	49	82	32	4	15.8	61.6	9.8	22.6	29.4	35.0	3.2	(25)	
(26)	72	94	51	51	27	1	49.9	73.4	2.0	53.1	19.8	19.1	6.0	(26)	
(27)	69	75	53	84	20	2	8.5	61.5	13.4	11.3	30.1	42.9	2.3	(27)	
(28)	38	40	23	46	94	2	5.0	41.7	5.8	12.4	24.1	54.9	2.8	(28)	
(29)	92	91	.	90	90	8	15.1	91.7	14.2	16.6	.....	56.5	12.7	(29)	
(30)	32	67	28	32	65	2	3.4	32.2	6.7	5.0	31.2	55.5	1.6	(30)	
(31)	17	114	22	10	82	4	2.3	16.8	6.7	2.0	33.3	57.2	0.8	(31)	
(32)	38	72	29	37	67	3	4.5	36.7	6.7	6.2	29.5	55.5	2.1	(32)	
(33)	45	57	55	39	56	4	3.4	44.3	5.8	6.0	27.6	58.2	2.4	(33)	
(34)	44	34	51	41	8	15	1.7	41.4	7.4	4.9	43.3	41.8	2.6	(34)	
(35)	57	81	64	51	49	2	3.0	54.5	8.5	3.7	39.7	45.5	2.6	(35)	
(36)	59	72	49	66	30	3	5.7	55.4	7.9	7.9	34.7	47.0	2.5	(36)	
(37)	75	79	44	79	80	25	9.6	69.2	3.8	12.1	10.5	68.5	5.1	(37)	
(38)	66	77	10	74	66	37	10.2	68.0	3.9	13.2	12.8	63.8	6.3	(38)	
(39)	73	77	22	80	80	4	9.1	75.4	3.7	11.8	10.3	69.5	4.7	(39)	
(40)	74	75	38	78	84	3	8.0	77.7	3.9	10.7	9.7	69.4	6.3	(40)	
(41)	74	79	44	78	77	17	10.0	75.5	3.9	12.6	11.1	68.0	4.4	(41)	

TABLE 4—COMPOSITION OF FEEDING STUFFS

Row No.	FEEDING STUFF	DIGESTIBLE NUTRIENTS AND COMPOSITION AS OFFERED TO ANIMALS									Row No.
		Total dry matter	Dig. crude protein	Total dig. nutrients	Nutritive ratio	Ash	Crude protein	Crude fiber	N-free extract	Ether extract	
		%	%	%	1:	%	%	%	%	%	
(1)	Oats, grain, under 5% fat...	86.2	9.0	58.7	5.5	3.2	11.9	9.7	56.7	4.7	(1)
(2)	—grain, 5% fat.....	84.4	7.3	68.0	8.4	3.1	9.3	7.7	58.6	5.7	(2)
(3)	—grain, 5% fat.....	87.4	8.7	59.8	5.9	3.5	11.3	11.7	55.1	5.8	(3)
(4)	—grain, under 9% fiber..	85.3	7.8	68.3	7.8	3.2	9.8	7.8	59.6	4.9	(4)
(5)	—grain, under 9% fiber...	78.7	9.1	52.1	4.7	2.4	11.4	6.8	53.8	4.4	(5)
(6)	—grain, over 9% fiber...	85.5	8.6	64.0	6.5	3.3	10.9	10.2	57.3	3.8	(6)
(7)	—grain, 9-12% fiber....	87.4	9.1	61.0	5.7	3.5	11.7	10.3	56.4	5.5	(7)
(8)	—grain, over 12% fiber...	86.9	7.1	53.4	6.5	3.3	10.3	15.3	52.4	5.6	(8)
(9)	—grain, under 14.5% moisture.....	86.4	8.6	65.9	6.7	3.4	10.9	8.9	59.4	3.8	(9)
(10)	—grain, under 14.5% moisture.....	87.6	8.8	59.0	5.8	3.5	11.6	11.3	55.7	5.5	(10)
(11)	—grain, tough, 14.5-16% moisture.....	85.1	8.3	66.4	7.1	3.1	10.3	9.1	57.9	4.7	(11)
(12)	—grain, tough, 14.5-16% moisture.....	85.0	9.0	58.1	5.5	3.3	10.7	10.7	55.1	5.2	(12)
(13)	—grain, sample grade, over 16% moisture...	83.4	6.7	63.1	8.5	3.3	8.8	9.0	57.3	5.0	(13)
(14)	—grain, sample grade, over 16% moisture...	78.7	9.1	52.1	4.7	2.4	11.4	6.8	53.7	4.4	(14)
(15)	—grain, 8% protein.....	84.8	7.4	67.8	8.2	3.1	9.3	8.6	58.8	5.0	(15)
(16)	—grain, 8% protein.....	87.0	6.1	58.6	8.7	2.9	8.4	19.3	51.0	5.4	(16)
(17)	—grain, 10% protein.....	86.0	8.8	64.7	6.3	3.4	11.2	9.3	58.3	3.8	(17)
(18)	—grain, 10% protein.....	86.4	8.0	55.9	6.0	3.3	10.7	11.3	55.5	5.6	(18)
(19)	—grain, 11% protein.....	87.0	9.0	59.9	5.6	3.6	11.7	10.4	56.0	5.3	(19)
(20)	—grain, 13% protein.....	89.6	11.9	68.3	4.7	3.5	14.3	10.1	55.6	6.1	(20)
(21)	Peas, seed.....	86.1	21.4	66.7	2.1	3.1	25.7	5.7	50.2	1.4	(21)
(22)	Potato tubers.....	24.8	1.4	22.9	15.7	1.0	2.2	0.8	20.7	0.1	(22)
(23)	—pulp, raw, pressed, dried	87.0	-0.5	67.5	.....	5.7	3.6	18.6	58.7	0.4	(23)
(24)	—spent residue, liquid....	4.2	0.8	3.7	3.3	0.6	1.1	0.6	1.8	0.1	(24)
(25)	Reed, common, reedgrass sedge mixed hay....	88.8	2.7	25.3	8.4	5.3	7.3	29.5	45.4	1.3	(25)
(26)	Rutabagas, roots.....	11.7	0.9	6.7	6.7	1.0	1.1	1.4	8.0	0.2	(26)
(27)	Sorghum grain, broomcorn...	86.2	4.3	56.5	12.0	2.8	10.3	5.4	63.3	4.4	(27)
(28)	Spelt straw.....	83.9	0.7	19.6	27.2	5.4	3.0	41.0	32.9	1.6	(28)
(29)	Sugar, feeding.....	96.1	1.9	76.4	38.2	2.9	2.8	1.3	88.9	0.2	(29)
(30)	Sunflower tubers, Jerusalem-artichoke.....	18.1	2.0	15.7	6.9	1.5	2.5	0.9	13.0	0.2	(30)
(31)	Timothy hay, all expts....	88.8	2.5	40.5	15.1	4.6	5.9	30.1	46.0	2.2	(31)
(32)	—hay, coarse.....	89.0	2.5	40.2	15.0	4.5	5.7	29.9	46.9	2.0	(32)
(33)	—hay, fine.....	88.0	4.5	43.3	8.6	4.8	7.7	28.3	44.7	2.5	(33)
(34)	—hay, full bloom.....	88.6	0.9	39.0	40.9	4.6	4.4	33.2	43.0	3.4	(34)
(35)	Velvetbean seeds and pods...	88.0	12.6	70.0	4.6	5.1	16.8	12.8	49.1	4.2	(35)
(36)	Wheat straw.....	83.3	0.3	39.5	109.2	7.2	3.6	32.8	38.0	1.7	(36)
(37)	—straw.....	83.6	0.9	27.9	30.5	4.8	3.2	40.5	33.9	1.2	(37)
(38)	—straw, winter.....	85.3	1.1	19.0	16.7	6.6	3.6	37.5	36.2	1.4	(38)
(39)	—straw, winter, steamed....	85.0	0	33.7	.....	6.5	1.8	36.2	38.5	2.0	(39)
(40)	—straw, winter, treated with NaOH, dry.....	85.1	.....	39.4	.....	6.5	1.9	40.5	34.5	1.7	(40)
(41)	—bran.....	88.2	15.0	80.9	4.4	5.7	15.6	4.5	58.6	3.8	(41)
(42)	—bran.....	88.2	10.8	43.7	3.0	6.4	14.8	9.7	52.4	4.9	(42)
(43)	Yeast, wet.....	16.3	8.5	14.3	0.7	1.3	9.3	.....	5.7	.....	(43)
(44)	—wood sugar.....	89.8	46.7	116.5	1.5	6.0	44.9	.....	38.1	0.8	(44)

## AND DIGESTIBILITY WITH HORSES—(Concluded)

DIGESTION COEFFICIENTS							DIGESTIBLE NUTRIENTS AND COMPOSITION ON A MOISTURE-FREE BASIS								
Row No.	Organic matter	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	No. of trials	Dig. Crude pro-tein	Total dig. nutri-ents	Ash	Crude pro-tein	Crude fiber	N-free ex-tract	Ether ex-tract	Row No.	
( 1 )	66	76	0	75	67	11	10.5	68.1	3.7	13.8	11.2	65.9	5.4	( 1 )	
( 2 )	76	78	42	79	87	7	8.6	80.6	3.7	11.0	9.1	69.4	6.8	( 2 )	
( 3 )	65	77	15	74	66	26	9.9	68.4	4.0	12.9	13.4	63.1	6.6	( 3 )	
( 4 )	77	79	39	81	83	12	9.1	80.1	3.7	11.5	9.1	69.9	5.8	( 4 )	
( 5 )	63	80	-102	80	69	1	11.6	66.2	3.0	14.5	8.6	68.3	5.6	( 5 )	
( 6 )	72	79	48	77	76	12	10.0	74.9	3.9	12.7	11.9	67.1	4.4	( 6 )	
( 7 )	68	78	11	75	68	29	10.4	69.8	4.0	13.4	11.8	64.5	6.3	( 7 )	
( 8 )	58	69	26	67	57	7	8.2	61.4	3.8	11.9	17.6	60.3	6.4	( 8 )	
( 9 )	75	79	42	79	78	11	10.0	76.3	3.9	12.6	10.3	68.8	4.4	( 9 )	
(10)	66	76	14	74	67	32	10.0	68.4	4.0	13.2	12.9	63.6	6.3	(10)	
(11)	76	80	49	78	81	9	9.7	78.0	3.7	12.1	10.7	63.0	5.5	(11)	
(12)	66	84	10	74	63	4	10.6	68.4	3.9	12.6	12.6	64.8	6.1	(12)	
(13)	72	75	36	77	82	4	8.0	75.7	4.0	10.6	10.8	68.6	6.0	(13)	
(14)	63	80	-102	80	69	1	11.6	66.2	3.0	14.5	8.6	68.3	5.6	(14)	
(15)	76	79	45	80	85	11	8.7	79.9	3.7	11.0	10.2	69.2	5.9	(15)	
(16)	57	72	25	77	70	2	7.0	67.4	3.3	9.7	22.2	58.6	6.2	(16)	
(17)	73	79	42	78	75	13	10.3	75.2	3.9	13.0	10.8	67.9	4.4	(17)	
(18)	62	75	8	71	60	10	9.3	64.7	3.8	12.4	13.1	64.2	6.5	(18)	
(19)	67	77	8	75	68	22	10.4	68.9	4.1	13.5	12.0	64.3	6.1	(19)	
(20)	72	83	27	78	75	3	13.3	76.2	3.9	16.0	11.3	62.0	6.8	(20)	
(21)	80	83	8	89.9	7	1	24.8	77.5	3.6	39.9	6.6	58.3	1.6	(21)	
(22)	97	63	75	101	42	3	5.5	92.5	4.2	8.8	3.3	83.4	0.3	(22)	
(23)	82	-15	68	92	141	6	-0.6	77.6	6.5	4.2	21.4	67.5	0.5	(23)	
(24)	97	77	103	104	149	2	20.2	87.5	14.3	26.2	14.3	42.8	2.4	(24)	
(25)	30	37	18	36	33	1	3.0	28.5	6.0	8.2	33.2	51.1	1.5	(25)	
(26)	65	83	-75	86	-12	2	7.5	57.5	8.4	9.0	12.0	69.1	1.5	(26)	
(27)	64	42	-11	74	61	2	5.0	65.6	3.3	12.0	6.3	73.3	5.1	(27)	
(28)	25	23	30	18	20	1	0.8	23.4	6.4	3.6	48.9	39.2	1.9	(28)	
(29)	68	70	32	83	50	2	2.0	79.5	3.0	2.9	1.4	92.5	0.2	(29)	
(30)	93	81	90	97	55	1	11.0	86.7	8.3	13.6	4.7	72.3	1.1	(30)	
(31)	48	43	43	53	13	14	2.8	45.6	5.2	6.6	33.9	51.8	2.5	(31)	
(32)	48	44	42	53	7	10	2.8	45.2	5.1	6.4	33.6	52.7	2.2	(32)	
(33)	52	58	47	56	8	2	5.1	49.2	5.4	8.8	32.2	50.8	2.8	(33)	
(34)	44	21	43	47	47	2	1.0	44.0	5.2	5.0	37.5	43.5	3.8	(34)	
(35)	79	75	63	85	81	1	14.3	79.6	5.8	19.1	14.5	55.8	4.8	(35)	
(36)	49	10	59	44	80	2	0.4	47.4	8.6	4.3	39.4	45.7	2.0	(36)	
(37)	34	28	36	30	84	3	1.1	33.4	5.7	3.8	48.5	40.6	1.4	(37)	
(38)	23	30	16	26	82	3	1.3	22.3	7.7	4.2	44.0	42.5	1.6	(38)	
(39)	40	0	46	36	70	2	0	39.6	7.6	2.1	42.6	45.4	2.3	(39)	
(40)	48	0	56	41	67	2	.....	46.3	7.6	2.2	47.6	40.6	2.0	(40)	
(41)	93	96	78	94	86	1	17.0	91.7	6.5	17.7	5.1	66.4	4.3	(41)	
(42)	52	73	22	53	27	10	12.3	49.5	7.3	16.8	11.0	59.4	5.5	(42)	
(43)	92	91	..	103	..	2	52.1	87.7	8.2	57.2	.....	34.6	.....	(43)	
(44)	129	104	..	178	109	4	52.0	129.7	6.7	50.0	.....	42.4	0.9	(44)	